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ECONOMIC AFFAIRS

EKO: ECONOMICS AND ORGANIZATION
OF INDUSTRIAL PRODUCTION

No 7, July 1985

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17 October 1985

USSR REPORT ECONOMIC AFFAIRS

EKO: ECONOMICS AND ORGANIZATION OF INDUSTRIAL PRODUCTION

No 7, July 1985

Except where indicated otherwise in the table of contents the following is a complete translation of the Russian-language monthly journal EKONOMIKA I ORGANIZATSIYA PROMYSHLENNOGO PROIZVODSTVA published in Novosibirsk.

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ECONOMICS CONSIDERED IN LIGHT OF SOCIOLOGY

Novosibirsk EKONOMIKA I ORGANIZATSIYA PROMYSHLENNOGO PROIZVODSTVA (EKO) in Russian No 7, Jul 85 pp 3-22

[Article by Academician T. I. Zaslavskaya, Institute of Economics and Organization of Industrial Production of the Siberian Branch of the USSR Academy of Sciences (Novosibirsk): "Economics Through the Prism of Sociology"]

[Text] Deep specialization of modern science has made it customary for various branches of knowledge to study complex natural and social phenomena simultaneously. Nobody is surprised today when physicists are asked to analyze chemical processes, geographers--demographic processes, and sociologists--economic processes. For each of the sciences sees one and the same phenomenon from its own point of view, and its contribution to the overall knowledge of this phenomenon is specific. Interdisciplinary research on complex phenomena produces a more complete and multidimensional view of the object.

Among the new areas developing at the juncture of social sciences is economic sociology, which tries to investigate laws of economic development using the means available to sociology. It is distinguished from associated disciplines which study the same phenomena by its specific viewpoint on economic life as an interaction of social groups which occupy, in V. I. Lenin's words, different positions in the historically determined method of production, perform specific production and social functions, are granted the same rights and responsibilities and pursue particular interests. The economic sphere of public life thus looks like a kind of "theater" whose many "actors" in the labor collectives play with varying degrees of success the roles of producers of products, organizers of production, distributors of material resources, planners, suppliers, accountants, controllers, workers in the sphere of services, and as family members--owners of private subsidiary farms, members of households, purchasers of products and industrial goods, consumers and so forth.

The activity and the interaction of groups playing economic roles are subject to the scenario drawn up by the society. For example, the conditions for labor and employment are regulated by labor legislation, the conditions for the purchase and sale of products--by state prices, and the interaction of associated enterprises--by economic agreements and planned funding.

At the same time the economic life of the society depends essentially on the actions and decisions made by people in keeping with their individual peculiarities and group or individual interests. It is precisely on this socially determined subjective contribution of participants in economic activity that sociologists concentrate their attention. How do people behave in the economic sphere? What macroeconomic consequences does their behavior entail? Why do people behave in one way and not another? Is it possible to control behavior? What methods are used to make the behavior--regulated by personal and group interests--more effective for the society? Economic sociology¹, which is only now taking its first steps, is called upon to give answers to these questions.

Behavior and Social Processes

Group and individual behavior affect all aspects of economic activity, predetermining its results to a considerable degree. Let us take as an example the behavior of people who influence the way labor resources are distributed and utilized. The point of departure is the natural reproduction of the population during the course of birth, growth and death. The greater the degree to which the birth rate exceeds the death rate, the more rapidly the population and the labor resources of the society increase. The level of the birth rate depends upon the age when men and women enter into marriage, the durability and duration of the marriages, and the prevailing ideas about the desirable number of children. The dynamics of the birth rate are reflected in the increase in labor resources some 15-20 years hence. In particular, their slow growth in the 1980's is the direct consequence of the lower birth rate in 1965-1970. As one can see, even kinds of behavior which at first glance seem to be intrafamilial in nature, when integrated into sociodemographic processes, become factors in the development of the economy.

The death rate also exerts no small influence on the dynamics of the population and labor resources. Its level depends more strongly on the behavior of social groups than is usually thought. A healthy and dynamic way of life, rational conditions for labor and recreation, the observance of safety techniques, prompt prevention and correct treatment of diseases contribute to prolonging life and the ability to work. The opposite type of behavior--mainly abuse of alcohol and a lack of exercise--lead frequently to serious illnesses and premature deaths.

One of the basic needs of the economy is to improve the quality of the labor force, first and foremost the level of education and professional qualifications of the workers. The state is improving the network of schools and is developing industrial and technical schools, tekhnikums and VUZ's. But the final result of this activity depends primarily on the students' attitude toward school: for the mastery of knowledge is voluntary by its very nature and it is almost impossible to force an individual to study well. Therefore the real knowledge acquired by the students for whom studying is an internal need and those for whom it is an external necessity are far from the same. And this is not all. Although legally a secondary education is mandatory in our country, in practice the youth who are not disposed toward education either stop at the eighth grade or finish school only in a formal way, for the

sake of the certificate. Naturally, knowledge obtained in this case turns out to be superficial, and thus does not exert a serious influence on the results of subsequent labor activity.

Upon completing school the young people, guided by personal interests, decide whether to continue their education and, if so, where, or else they begin working. The multitude of decisions regarding this, which are externally independent of one another, when realized in practice form the social process which in the final result predetermines the dynamics of the occupational-skill structure of the society's labor force.

Let us take, finally, the territorial distribution of labor resources. As we know, more than 10 percent of the country's population resides in Siberia and the Far East; this zone has 15 percent of the fixed production capital and some 50-90 percent of the supplies of fresh water, timber, fuel and energy resources and mineral raw material. The main thing that limits the rates of assimilation of the eastern regions is the shortage of labor force. Conversely, in the European part of the country the population is relatively large, and the natural resources much less abundant. The society, consequently, wants the population to migrate from the west to the east. But in fact, as was noted at the 26th CPSU Congress, people "still frequently prefer to move from the north to the south and from the east to the west, even though efficient distribution of productive forces requires movements in the opposite directions."²

Migration is one of the forms of socioeconomic behavior. When making a decision to move to a new place of residence, the family weighs all the pros and cons for, as the saying goes, "to move twice is the same thing as losing everything in a fire." Usually people decide to migrate only when they are confident that things will be better for them in the new place, although everyone interprets the concept "better" in his own way. Some people want to go where the climate is milder, where living is less expensive or where working conditions are more healthful, while others like the combination of hard work and high earnings, and still others are attracted by places where there are many youth, interesting leisure and families are formed more rapidly. When selecting a new place of residence, each group is guided by interests and builds its own hope. But the totality of migrations forms a mass migratory flow among the republics, oblasts, the city and the country, contributing to territorial redistribution of the population and labor resources in one direction or another.

The occupational-labor behavior of workers in work positions predetermines the quality of public labor which, in turn, influences the effectiveness of production, the quality of products and the rates of national economic progress. Production and economic activity in the private sector of the economy (private subsidiary farms, collective orchards, individual construction and so forth) is reflected in the level and structure of national income and the ratios of the incomes of social groups. Consumer behavior divides the products of labor into consumer values which are given public recognition and rejected products which the consumers do not need. Here, too, the macroeconomic processes become the integrated total of a multitude of independent behavioral acts.

From what has been said, apparently, it follows that a study of the socioeconomic behavior of people and a clarification of its patterns can shed additional light on the processes of economic development and explain certain tendencies that are observed here.

The Main Motive Force of Behavior--Interests

But what, actually, is behavior? How does it relate to the general concept that reflects people's active attitude toward the surrounding world--reality?

The main content of human activity is to transform the materials of nature into a product which satisfies certain needs. Economic activity is expressed in the production of material goods and services, their shipment, storage and sales, in the planning and organization of production, the formation of the economic mechanism, the organization of credit and monetary circulation, the distribution of resources and incomes, and so forth.

Behavior is a subjective aspect of activity, that is, the totality of deeds and actions that reflect people's internal attitude toward the conditions, content and results of activity. Behavior is always regulated by some more or less realized goal and presupposes a certain freedom of selection of deeds and actions from a multitude of possible ones. The more strictly the content and conditions of activity are regulated, the narrower the area of manifestation of behavioral factors and the weaker their influence on the result of this activity.

At the basis of the selection of mass forms of economic behavior lie the interests which are defined in the literature as the "real causes of social actions which stand behind the immediate incentives--motives, intentions, ideas--which participate in these actions of social groups and classes."³ Interests seem to be formed on the border between the objective conditions of life activity and group awareness. While they are an element in awareness, at the same time they directly reflect the peculiarities of the objective position of the group. The peculiarity of a socialist society lies in the community of basic interests of the classes and groups, which consists in strengthening the leading role of the party, developing socialist public environment, and raising the level of material and social well-being of the people. But along with common interests, the social groups also pursue their own interests which they sometimes strive to realize even in spite of the interests of other groups.

One can find as many examples as one wishes of the lack of correspondence and the struggle of economic interests. Let us just recall certain widespread situations. A producer plant is motivated to fulfill and overfulfill the plan for "gross output" and to reduce expenditures on the products, even if this means a certain deterioration of their quality, while for the consumers the most important thing is precisely the quality of the items. A construction organization is at great pains to release an uncompleted facility on time, promising to eliminate the unfinished work later; but the future users of the structures that are erected insist on precise fulfillment of the plan. The book trade is interested in rapid circulation of the commodity and large editions which are sold out in 2-3 days; but the authors and purchasers would

like to see in the book stores books which were published some time ago. It is convenient for residents of a small village to have the bus stop near their home. But a light load on the line makes this disadvantageous for the automotive business, and the route is closed. One can multiply this number of examples, but even from the ones that have been given, it is clear that at the very basis of the economic life of the society lies the interaction of groups which are pursuing different interests.

At the June (1983) Plenum of the CPSU Central Committee it was noted that in the Soviet society, "as in any social organism, there is a struggle between the new and the old, there are not only creative, but also negative tendencies. These include, for example, local and departmental prejudice, bureacratism and conservatism. It is necessary to uncover the reasons for these and other similar phenomena and find means of overcoming them."⁴ The phenomena named at the July Plenum of the CPSU Central Committee are nothing other than misshapen forms of manifestation of the interests of certain groups of management workers which contradict the interests of the society as a whole. Behind the majority of social contradictions, as a rule, one discovers a collision of interests of various social groups.

What Determines Interests?

The interests of social groups depend on their position in the system of economic, social and political relations. In his work "The Great Initiative" V. I. Lenin gave the classic definition of social classes as large groups of people distinguished by their position in the historically concrete means of public production. In order to describe the position of these groups he suggested three important interconnected characteristics, namely: a) their role in public organization of labor, b) their relation to the means of production, and c) their share of public wealth and their means of obtaining it. It seems that these indicators are applicable for singling out not only classes, but also more limited groups which are distinguished by their social position--intraclass, interclass and extraclass (which, incidentally, is being done in Soviet sociology).

Then the first indicator is used to single out groups which are distinguished by the nature of their functions in the society and the concrete content of their labor. Among them are workers in public production, representatives of political power, military service men, figures in literature and art, and so forth. Production workers are divided up according to this indicator, on the one hand, into departmental-branch groups and labor collectives of enterprises and organizations and, on the other, representatives of physical and mental labor, performance and administrative labor, and particular types of occupations.

The second of Lenin's indicators divides groups with different rights and authority with respect to property, ownership, and disposal and utilization of gains of production. From this point of view, one distinguishes first and foremost workers in the state and kolkhoz-cooperative sector of production, and also owners of private means of production who are not employed in the public sector (owners of private subsidiary farms, small scale craftsmen, and so forth). Further, groups distinguished by the breadth and content of their

rights to dispose of public property are set apart. Such, for example, are workers who distribute production resources and prepared products among the branches, enterprises, and territorial units; workers in material and technical supply and wholesale and retail trade; and economic workers of one level or another.

As for the utilization of means of production, this has a dual social significance. Its first significance is related to the quantity, quality and technical improvement of the means of production used by occupational groups and labor collectives. Thus in the process of their labor, metallurgists use complicated and costly equipment, which presupposes high skills and responsibility, while subsidiary workers use simple hand implements. As a result, both the material remuneration and the social prestige of these groups are essentially differentiated. The need and ability to apply complex and unique technical devices in the process of labor raises the social status of the corresponding workers.

The second significance of the indicator is related to the potential possibility of semilegal utilization of public means of production (and sometimes even some of the prepared products) for private needs or for sale on the side. From this point of view it is possible to single out three groups of workers. The first is comprised of people employed in labor whose content and conditions preclude the possibility of utilizing public property for private purposes. The second group combines workers who have the opportunity to utilize means of production that have been entrusted to them in order to satisfy their own needs or to gain income. This pertains to certain truck drivers, railroad conductors, agricultural machine operators and several other categories of workers. The third group includes workers who have, because of their position, the potential capability of manipulating certain production resources (feeds, construction materials and so forth) or some prepared products.

According to the third of Lenin's indicators, one can single out groups of families with various sources and different levels of income. In a socialist society the main sources of income are wages in public production, monetary payments from public consumption funds (to students, invalids, pensioners, single mothers and so forth), products from private labor and material assistance from other people (alimony, inheritance and so forth). Most of the workers who are living mainly off income from public production are divided into groups of families with small, medium and high incomes. In addition to these, the society has groups whose main source of income is a large or highly productive private business. One also encounters, although not in very large numbers, people who are active in the so-called "shady" economy who utilize illegal means of obtaining incomes.

At first glance, the social groups singled out according to each of the three indicators are independent. But this is not really true. As a rule, the branch, territorial, occupational-skill and job groups (position in public organization of labor) to which the workers belong predetermine their attitude toward the means of production, their wage level and the overall structure of their income. Thus the socioeconomic position is not a random set of values

and several unrelated indicators, but a total description of social groups which predetermines their interests and behavior.

It turns out, consequently, that the behavior of groups in the socioeconomic sphere, which frequently appears to be random at first glance, has fairly deep roots in the social structure of the society. The means of this behavior are mainly and fundamentally predictable. But if this is so they comprise a subject for sociological analysis. They should be studied comprehensively, taking into account, in the first place, the ties among various kinds of behavior; in the second place, the economic and social factors that determine behavior; and, in the third place, the potential possibilities of directing economic behavior along the lines of public interests.

Administrative Guidance of Activity or Economic Regulation of Behavior?

Centralized distribution and regulation of economic activity reflects the planned nature of the socialist economy while the behavior of people embodies its random basis. In the development of the socialist economic planning plays a major role, and spontaneity--a secondary role. But this certainly does not mean that economic activity controlled in a planned way and socially determined behavior can and must contradict one another like things that are "good" and "bad," "truly socialist" and "not altogether socialist." For behavior reflects the realized nature of activity, its subjective basis, its dependency on the social qualities of people. Whatever these qualities are, such is the behavior of the groups and such is the influence of this behavior on the results of economic activity. Various forms of behavior can contribute both to increasing and reducing its results.

The movement for Communist labor, the organization of student construction detachments and youth housing cooperatives, the activity of efficiency experts and inventors, the increased socialist commitments made by labor collectives, the suggestion of new forms of socialist competition, the search for effective forms of organization and payment for labor, the conducting of various kinds of socioeconomic experiments locally and other such undertakings can serve as examples of the behavior of workers who are solely responsive to public interests. Behavior which contradicts the interests of the society is most frequently manifested in poor quality of labor, inefficient handling of means of production, poor labor and production and discipline, write-ups, speculation, theft and so forth. Of course the state is interested in developing the positive and overcoming the negative forms of economic behavior of the workers. But how can this be achieved if the behavior reflects subjective factors which are predetermined by personal interests?

We know of two main approaches to regulating behavior: a) administrative limitation of the freedom of selection of its forms through detailed regulation of activity and b) indirect economic regulation or the content of behavior through adjustment of group interests. Both approaches are equally necessary and they augment one another. Thus without direct administrative control of the main kinds of economic activity a planned economy could not develop at all. But regulation that is too detailed stands in contradiction to the position of the workers as owners of the means of production, impedes the development of the "feeling of being the master" and obstructs complete

disclosure and utilization of capabilities. By depriving labor of its creative elements and removing the authentically human essence from it, this transforms labor into drudgery.

On the other hand, weakening external regulation and control of labor and economic activity leads to a strengthening of random elements in the development of a socialist economy and to an increase in the role of behavioral factors. It becomes necessary to have a complex and ramified system of economic stimuli and sanctions which coordinate the group interests of the workers with public interests. And it is immeasurably more complicated to develop, implement and assimilate a system of economic control of the economy than it is to control with the help of directives and orders.

Consequently, the task is to find a ratio between administrative and economic methods of controlling behavior in the economic sphere which is efficient for both kinds of specific conditions. This is achieved through the corresponding "adjustment" of the economic mechanism, that is, the selection of the variant which corresponds best to the condition of the productive forces.

The economic mechanisms of the socialist countries differ essentially in terms of their ratios between direct (administrative) and indirect (economic) methods of managing the economy. In the USSR national economy the role of administrative management is relatively large. The economic activity here is regulated in more detail and more rigidly, in the area of realization of behavior is relatively narrow.

The fact is that the main qualitative features of the current mechanism for managing the national economy took form as early as the 1930's.⁵ Since that time this mechanism has been repeatedly updated and improved, but the initial ratio between administrative and economic methods of controlling activity and behavior have not changed essentially. Yet the productive forces of the Soviet economy have changed beyond recognition over the decades. There has been a 10-fold increase in technical equipment for labor, the type of technologies that are used have changed radically, and the requirements for the skills and responsibilities of the workers and for social labor discipline have increased incomparably. Immense positive changes have taken place in the social characteristics of the workers as well. This has been reflected not only in overcoming illiteracy and rapidly raising the level of general and specialized education, but also in increasing the degree to which the workers are informed about scientific-technical and sociopolitical matters, making their demands and interests more complicated, and to developing legal and personal self-awareness. The change in the subjective qualities of the workers, in turn, has led to an increase in the diversity of economic behavior, a complication of its content and motivations, and a strengthening and complication of the interaction between "managing" and "managed" groups at all levels of the public hierarchy.

Additionally, the significant rise in the standard of living has reduced the economic need for extremely hard work on the part of the workers in order to obtain a livelihood. The majority of social groups now have the possibility of selecting between extremely hard work which provides for increased earnings and limited participation in public production with average earnings.

On the one hand, the large positive social changes have increased the requirements for flexibility, elasticity and manageability of the labor force, and, on the other, they have made regulation of the behavior of the workers more difficult than it ever was before. The effectiveness of administrative methods of managing economic activity has decreased, and on the whole the economic mechanism that has taken form under the new conditions has reached a point where it is not effective enough. This is manifested externally in the frequent violations of the planned nature of production and material and technical supply, in the weakening of economic incentives, and the weak dependency of the income of some of the workers on the results of their labor in public production, and so forth.

As for the social consequences of the fact that the economic mechanism is lagging behind the times, perhaps the main one is the excessive growth of the administrative staff which is accompanied by reduced effectiveness of the management of the activity and behavior of the workers. The fact is that administrative management has internal limitations and under certain conditions it can be turned into its opposite. Indeed, administrative control is directed primarily toward limiting behavior which stands in contradiction to public interests. But the control functions are assigned to people who also have their own interests. As is evidenced in the press, people whose duty it is to check on the observance of state interests are not always equal to their task and in some cases they are capable of sacrificing public interests for private ones. This means that their activity and behavior must be monitored as well.

This principle leads to a multilevel system of administrative management and control, which inevitably assumes bureaucratic features. The controllability and manageability of economic processes do not increase, but rather decrease since word frequently diverges from deed, and reports diverge from real facts.

The conclusion that comes to mind is that it is necessary to change the overall strategy of management of the human factor in production: limitation of administrative regulation of economic activity and concentration of attention on regulation and stimulation of progressive modes of behavior. This need is recognized by the party and reflected in the decisions of the CPSU Congresses and party plenums. The party links the crucial task of intensification of the economy to increased democratism in the management of the national economy, the development of the initiative of production leaders, rejection of red tape in their activity, increased labor activity of the workers, and improvement of the utilization of the labor and creative potential of the society. We are speaking about expanding the area selection of the behavior of workers, the development of their rights and an increase in their responsibility for the results of economic activity.

The changeover to primarily economic methods of management raises a multitude of complicated new problems related to improvement of the economic mechanism which are being extensively discussed in the press, including on the pages of EKO. Since these problems do not fall within the subject matter of this article, we shall not discuss them. But let us turn to the connection between the economic mechanism and the social structure of the society.

The Economic Mechanism and the Social Structure

Improvement of the mechanism for managing the economy is called upon to solve economic and social problems simultaneously, as parts of a single complex. Yet the economic and social criteria of the effectiveness of this mechanism cannot not only coincide, but can even contradict one another. Thus the majority of socialist countries allow the activity of small private enterprises in retail trade, public catering or consumer services. They help to utilize more fully the labor potential of the population, including those not employed in public production, and to satisfy the demand for services better. From the economic standpoint this measure is extremely effective. At the same time the appearance of a group of individual owners of means of production who are not participating in public production and who receive increased incomes violates the principle of distribution according to labor, hence leads to increased social differentiation of the society.

The appearance of such collisions requires deliberate consideration of alternatives for development and arrangement of economic and social priorities. If preference is given to economic goals, it is necessary to have social control over the social results from the change in the economic mechanism; but if priority is given to social goals, it is necessary to check especially carefully on the economic results of the restructuring. On the whole, the social consequences of the change in the economic mechanism are no less significant than the economic ones.

The most essential influence is that of the economic mechanism on the social structure of the society, that is, the composition and position of its classes, social segments and groups. It seems that the proper amount of attention is not yet being devoted to studying this connection. Problems of improving the economic mechanism are frequently investigated from purely economic standpoints, without taking into account its connection with the social structures; and the dynamics of this structure are analyzed independently of the change in the mechanism for managing the economy. Yet we are speaking about two sides of one and the same phenomenon, for the economic mechanism is a concrete form of realization of the economic side of production relations, and the social structure of the society reflects their social side. As we know, the classics of Marxism-Leninism have always regarded the economic and social sides of production relations in an indissoluble unity, and our science should not lose this valuable tradition.

How is this connection realized, and what significance does it have for the development of the economy? We have already discussed the factors that determine the position of social groups in the socialist method of production. The majority of factors are economic in nature and directly reflect the peculiarities of the existing system of management of the economy. Consequently, in a certain sense one can say that whatever the economic mechanism for managing the economy is, such is the social structure of the society and such is the position of the social groups.

In fact, it is difficult to name an element of the economic mechanism which, if changed, would not influence various groups of workers. Take, for example,

the problem of overcoming departmental interests in the management of the national economy. It is obvious that an essential reduction of the number of branch ministries and a narrowing of their functions in the management of the national economy would cause a sharp reduction of the number of people on the state staff for management of the economy and a marked weakening of the influence of certain categories of management workers. The development of economic independence of the enterprises leads to an expansion of the rights, a strengthening of the economic influence and an increase in the social prestige of the managers of enterprises while the workers of the ministries lose some of their rights. A restructuring of the system of wages, a change in the principles for the distribution of social goods and a removal of the limitations on the sizes of private subsidiary farms--each step like this inevitably brings about the corresponding changes in the social structure and in the social differentiation of the society.

One of the conclusions is that the real development of production relations takes place not only and not so much as a result of the professional activity of the workers who are especially employed in this as in the complex process of interaction of socioeconomic groups who hold various positions in public production and pursue contradictory interests.

The Social Mechanism for Improving Production Relations

At the June (1983) Plenum of the CPSU Central Committee it was noted that "in our social development we have now approached a point in history where deep qualitative changes in the productive forces and the corresponding improvement in production relations are not only imminent, but have even become inevitable."⁶ In the decree of the CPSU Central Committee concerning the work of the Institute of Economics of the USSR Academy of Sciences, social scientists were given the task of studying ways of improving socialist production relations in close connection with the social processes taking place.⁷ There arises a questions of how the social mechanism is providing for improvement of production relations in socialism.

According to the opinion asserted in our social literature, in a socialist society there are not and cannot be any groups that are interested in retaining outdated relations, and therefore there is no room for social conflicts because of changes in them. These points can be interpreted in the sense that the development of production relations under socialism are not so much social as technical in nature so that all that is necessary is to note promptly the need for their improvement and to take the necessary measures at the right time.

But the facts do not bear out this point of view. They show that an understanding of the reasons for the delay in the development of the economy and even a knowledge of possible ways of overcoming obstacles are inadequate to achieve the necessary advances in economic practice. The modern stage of improvement of management of the economy began in the middle of the 1970's, but for many years the work in this direction, according to an evaluation on

the 26th CPSU Congress, proceeded too slowly and half-heartedly. Thus attempts at more extensive utilization of economic methods were frequently replaced by a return to administrative methods of management, and we did not manage to achieve an appreciable expansion of the economic rights of the enterprises. It would seem that these phenomena are hardly random.

The subjective attitude of social groups toward the earmarked restructuring of the economic mechanism has been studied more and more intensively in recent years by economists and sociologists: the first results of the research have begun to appear in the press. Along with personal observations, this makes it possible to briefly describe the peculiarities of the positions of various groups with respect to the proposed changes.

The attitude toward the restructuring of the economic mechanism in the direction of more extensive application of economic methods of management, it seems, is most strongly distinguished in groups that are set apart depending on: a) their position in the hierarchical system of management of the economy and b) the particular social types to which the workers belong.

In terms of the first indicator, one can single out three large vertically ranked groups: workers, in the first place, of organizations for interdepartmental management of the national economy (Gosplan, the State Committee for Labor and Social Problems, the State Committee for Prices, the Ministry of Finance and so forth); in the second place, workers of branch ministries and departments and also their territorial administrations; and, in the third place, workers of associations and enterprises. The differences in the attitudes of these groups toward the earmarked restructuring of the management of the economy are conditioned to a considerable degree by the fact that the prestige and social position of the first and third groups will increase as a result of the changes while they will decrease for the second group. The fact is that the current system of management of the national economy typically has a relative weakening of both the lower and upper levels of management with a clear hypertrophy of the middle level. In order to open up space for the growth of productive forces, it is necessary to restore a correct ratio among the vertical levels of management, while simultaneously expanding the rights of both the central economic organizations and the enterprises.

In terms of the second indicator, one can single out two social types of workers with essentially different attitudes toward the earmarked restructuring of the economic mechanism. The first type is represented by the more educated, skilled and energetic part of the personnel who strive for complete self-realization in labor and sometimes toward professional advancement. These people, as a rule, feel that under the corresponding conditions they could work more intensively and with greater return, and obtain a correspondingly higher income and live better and more interestingly. The majority of workers of this type strive for greater independence in making professional decisions and space for initiative so as to work fully up to

their capabilities and to consume according to the results of their labor. Apparently, workers of this type represented in various proportions at all hierarchical levels and are the main social force for improving economic relations. Another social type is comprised of the less skilled and relatively inert part of the personnel. These workers fear, not without justification, that under the new conditions more difficult duties, the greater requirements for skills and the need to be reeducated and change their work style will worsen their position and therefore they are in no hurry to change the present state of affairs.

For success in improving production relations it is necessary to have a well-thought-out social strategy which is capable, on the one hand, of consolidating the groups who are actually interested in intensification of the economy and the corresponding restructuring of the methods of management, and, and on the other, blocking the actions of groups which are inclined to impede the solutions to crucial problems. This is precisely the way the task is set by the party when it points out the need to promptly disclose and overcome crucial contradictions. It is therefore especially important, as was pointed out at the extraordinary February (1984) Plenum of the CPSU Central Committee, to achieve a close interconnection in the economic, social and spiritual progress of the society of developed socialism. A rise in the economy to a qualitatively new level presupposes the social prerequisites that are necessary for this.

FOOTNOTES

1. For more detail see: Zaslavskaya, T. I., Ryvkina, R. V., "On the Subject of Economic Sociology," IZVESTIYA SO AN SSSR. SERIYA EKONOMIKI I PRIKLADNOY SOTSIOLOGII, No 1, 1984, issue 1, pp 9-20.

2. "Materials of the 26th CPSU Congress," Moscow, Politizdat, 1981, p 54.

3. "Filosofskiy Entsiklopedicheskiy Slovar" [Philosophical Encyclopedic Dictionary], Moscow, Sov. Entsiklopediya, 1983, pp 213-214.

4. PRAVDA, 15 June 1983.

5. See, for example, Kurashvili, B. P., "The Fate of Branch Management," EKO, No 10, 1983, p 34; Karagedov, R. G., "On Improving the Economic Mechanism," IZVESTIYA SO AN SSSR. SERIYA EKONOMIKI I PRIKLADNOY SOTSIOLOGII, 1984, issue 1, No 1, p 22.

6. Materials of the July (1983) Plenum of the CPSU Central Committee, Moscow, Politizdat, 1983, p 115.

7. "On Increasing the Role of the Institute of Economics of the USSR Academy of Sciences in the Development of Key Issues of Economic Theory of Developed Socialism," Decree of the CPSU Central Committee, PRAVDA, 14 February 1984.

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EXPERIENCE IN INCREASING INDUSTRIAL OUTPUT RELATED

Novosibirsk EKONOMIKA I ORGANIZATSIYA PROMYSHLENNOGO PROIZVODSTVA (EKO) in Russian No 7, Jul 85 pp 23-37

[Article by B. Ye. Trinchuk, candidate of technical sciences, general director of the Odeskislrod mash NPO (Odessa): "Odeskislrod mash": Increased Output Without Increased Resources"]

[Text] The Odeskislrod mash NPO is an average-sized association. The results of its work for efficient and thrifty utilization of resources cannot be impressive because of the immense figures for savings. The association's experience is valuable because an integrated system of economic management has been created here, which includes the entire collective, from the developers of new equipment to the individual worker.

We are offering a selection of materials concerning the experience in economic management of the Odeskislrod mash NPO.

Practice shows that in the organizational-management sphere of the enterprises and associations there are significant reserves for more economical management. In what, in our opinion, does the logic of this management consist? First of all in the fact that all methods and principles of management of scientific and technical developments as well as production at the association or enterprise can be reduced to a unified system which is clearly oriented toward production effectiveness. In the scientific production association, on the one hand, it is more difficult to implement such a system than it is in other types of production and economic organizations. The reasons for this have been discussed repeatedly in the past. They include separate planning and financing of science and production, and separate incentives for each of the structural units. On the other hand, the NPO has a great advantage in bringing scientific-technical developments and their implementation together in the hands of one group of managers. This makes it possible to improve management methods on the basis of the achievements of scientific and technical progress. We have tried to make use of this advantage.

Savings Must Be Planned!

Our NPO is the Scientific Research Institute of Technology of Cryogenic Machine Building (NIIPKriogenmash) and the Avtogenmash Plant. The institute is the head technological organization of the Soyuzkriogenmash VPO. It is developing new technological processes for enterprises of the subbranch. In addition to this, for the plant of its own NPO it does all the design developments for the products that are produced.

The plant's initial planned capacity was reached in 1972 and by now it is almost twice that amount. Initially the plant produced equipment for thermal cutting of metal and this is why it is given the title Avtogenmash. Now another area of production is developing rapidly--cryogenic technical equipment: the manufacture of air distribution installations, pumps for pumping cryogenic liquids, sets of turbogenic equipment, gasification installations for liquifying gases, including oxygen and nitrogen, installations for purifying helium at atomic electric power stations, equipment for the production, transportation and storage of liquid hydrocarbon gas and so forth.

The products of the enterprise are characterized by a high level of complexity: machines with programmed control, turbogenerators with high rotation speeds--200,000 circulations of the rotor per minute, and so forth. Our equipment must operate under conditions of significant drops in temperature and pressure. It is understandable that in sets of equipment that are so complicated and are used for such important purposes one applies high-quality ferrous and nonferrous metals and expensive chemicals and batching items. Material expenditures take up the largest share of the overall expenditures on an item--from 55 to 60 percent. Therefore reducing the material-intensiveness is one of the main factors in increasing the effectiveness of our production.

Under the 10th Five-Year Plan, on the initiative of the metallurgical shop through which most of the metal consumed in the association passes, socialist competition was developed for economizing. During 5 years the shop managed to save 375 tons of metal through introducing efficient methods of cutting, changing the procurement of a number of parts from gas and guillotine cutting to stamping, the utilization of metal scraps for small parts, and other modern technological solutions and advanced labor methods. The shop workers came out with the initiative: "To provide for the entire increase in the volumes of output of the NPO without increasing material expenditures." It was supported by collectives of other shops.

Additionally the reserves for economizing showed that not all organizational and technical possibilities of improving production are being utilized. Certain opportunities are bypassed by technologists, designers, and the administrative service. The base for efficient utilization of resources in the future can be created only by changing over from individual particular initiative to a system of planned work for reducing expenditures.

Usually in intraplant cost accounting [khozraschet] most of the attention is devoted to reducing expenditures right in the production subdivisions.

Economizing on materials and reducing labor-intensiveness are planned, monitored and taken into account in the brigades, shops and sections. Most frequently the functional and scientific-technical subdivisions are not included in cost accounting relations. Yet these developments influence the economic well-being of the enterprise or association to an immense degree. Therefore we considered enlisting them in purposive work for reducing expenditures to be an important condition for increasing the effectiveness of production. We have begun to plan for all scientific-design and functional subdivisions assignments for reducing those kinds of expenditures on which they exert an influence.

One cannot say that previously the developers of the designs did not think about how to make the machine more economical. But for them it was always more important to achieve a high technical level of the item and good operational characteristics and indicators of reliability. Previously, if according to the new plan the metal-intensiveness of a machine turned out to be higher than the analogue that was already being produced, the designer was not especially concerned and tried to show the need for the increased expenditure of materials. Nor was he bothered by the increase in labor expenditures in production.

We had to learn to direct the creative research of the designers toward reducing expenditures and to involve them in the economic concerns of the association. Let us say frankly that it was not an easy thing. It was necessary to overcome a serious psychological barrier. Certain designers regarded the assignments for reducing expenditures as an invasion of the holy of holies--their creative laboratory. Others did not immediately understand what was required of them and to what degree they were supposed to deal with economy. The first solutions were on the surface, like any first solutions, for example, replacing bolts that were 6 millimeters in diameter with 4-millimeter bolts (a trivial savings!).

We did not hurry the designers and gave them time to look around and think. Gradually they began to include economic considerations in more fundamental parts of their plans, and they turned to the method of functional cost analysis, comparing the correspondence of the expenditures on one component or another to its functions and purpose.

Technologists have always been more closely associated with production than designers have. But they have basically been limited to the development of technology for plans that have already been accepted from the designers, which have not always been optimal in terms of metal-intensiveness and labor-intensiveness of manufacture. It was necessary to create an organizational and economic mechanism whereby the technologist would play a larger role in the work for reducing expenditures. In the shops it was necessary to combine the initiative of participants in the competition and their socialist commitments for economizing with planning activity. To do this it was necessary to create a system of planning, accounting and control over the savings on resources, evaluation of results and incentives.

The Main Principles of the System

On the structural plane one can see what the system is from the diagram that is appended. It is a complex of interconnected subsystems that encompass all the functions, from planning and organization of the management of resources to public support of the system. This structure makes it possible to realize its main principle--responsibility for efficient utilization and economy of material and labor resources at all levels of management of science and production.

Thus the divisions for planning and economics, organization of labor and wages, and the scientific and technical council of the NPO are responsible for the development and issuance of specific assignments for economizing. The head technologist is responsible for calculating the need for material resources during the planned period and the coefficient of utilization of metal and also the introduction of resource-saving technologies. The association's first deputy general director for scientific work is responsible for the organization of cooperation with scientific research institutes, design buros and VUZs for reducing resource-intensiveness. The trade union committee is responsible for forming creative brigades consisting of engineering and technical personnel and workers in order to solve the most important technical problems for reducing expenditures and also for the organization of socialist competition.

It is necessary to take note of one other principal peculiarity of the functioning of the system, which is related to the method of accounting for the results. From the time of the introduction of the new technical equipment, new plan for a machine or the new component or technical solution, because of which the metal-intensiveness or labor-intensiveness has been reduced, the corresponding changes are made in the norms for the expenditure of material and labor resources. Thus not the conventional, but the actual savings are taken into account.

The system approach to managing resources has forced us to devote more constant attention to the preparation for the fulfillment of the next year's plan. There can be no unified system here--everything depends on the concrete conditions of the enterprise. For example, we have the following policy.

The draft of the plan is drawn up in the first quarter of the year preceding the year being planned. Its initial breakdown for the various quarters and shops is done by the planning and economics division of the association by hand. Then the draft of the plan is fed into the computer. Computer calculations make it possible to determine the need for labor resources and equipment in each shop. They are discussed and after this they are adjusted and again fed into the computer until a variant is reached which provides for a uniform load of people and equipment and a minimum of "bottlenecks." The draft of the plan is approved by an order of the director and at the same time--the plan for organizational and technical measures to provide for the fulfillment of the production program.

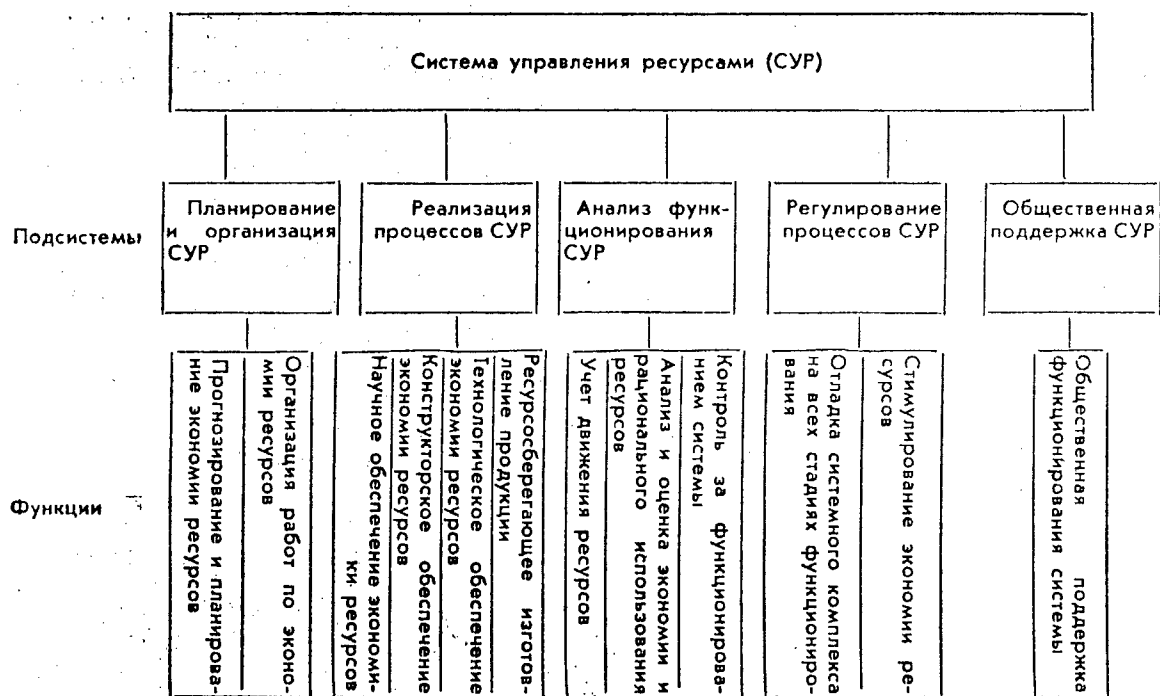


СХЕМА УПРАВЛЕНИЯ РЕСУРСАМИ

Figure. Diagram of Resource Control

Key:

1. Resource control system (SUR)
2. Subsystems
3. Planning and organization of SUR
4. Implementation of SUR processes
5. Analysis of function of SUR
6. Regulation of SUR processes
7. Public support of SUR
8. Functions

9. Public support of system functioning
10. Incentives to economize on resources
11. Adjustment of system complex in all stages of functioning
12. Control over system functioning
13. Analysis and evaluation of economy and efficient utilization of resources
14. Accounting for movement of resources
15. Resource-saving manufacture of products
16. Technological support for economizing on resources
17. Design support for economizing on resources
18. Scientific support for economizing on resources
19. Organization of work for economizing on resources
20. Prediction and planning of economy of resources

Scientific and Technical Support for the System

The analysis conducted in the NPO shows that we obtain 95 percent of the reduction of metal-intensiveness and 70 percent of the reduction of labor-intensiveness as a result of design and technological solutions. Thus a most important factor which determines the effect of the system for managing resources is its scientific and technical support.

If the developers of the products and new technologies were not organizationally linked to production we would not be able to plan savings for them and would end up being dependent on those technical decisions which they offer, even if these decisions did not suit us. The advantage of the NPO--the integration of science and production--has played a decisive role in the work for economizing on resources. The availability of a production base "at hand" for the institute makes it possible not to be limited simply to the development of designs of items and technology. Any new technological decision proposed by the institute is realized first of all at the Avtogenmash Plant, and then, after testing and refinement, it is offered to other enterprises of the subbranch. The effectiveness and the authority of the developments are increasing.

A unified assignment is established for the institute for reducing labor-intensiveness and material-intensiveness, and after that the managers distribute it among the various divisions and departments. Thus each primary cell of the scientific and technical collective knows its specific tasks for economizing on resources.

There are two important aspects of the organization of scientific and technical support for the system of resource control. These include increasing the functions of prognostication and creating a scientific and technical stockpile for the future.

It seems to us that it is necessary to predict both the tendencies in the development of products and technology and the dynamics of expenditures. This will help to determine promptly which items should be modernized and which should be removed from production and replaced with new ones.

This kind of goal-directed orientation toward economizing has required closer interaction between technical and economic subdivisions. As we know, these services are usually far from one another. They have few points of contact. They communicate either during the time of drawing up the draft of the plan or during the establishment of bonuses for the fulfillment of assignments for new technical equipment. And then the communication is on the level of the managers. It has been necessary to find organizational forms for closer contact between engineers and economists. Technical and economic commissions have proved to be an effective form of cooperation. They are created for each new and modernized item and are approved by an order of the director.

The commission includes designers, technologists, economists and norm setters. Its task is to monitor at all stages of planning the correspondence of the actual indicators of expenditures to the planned ones, and to compare their level with the average values of expenditures for similar items. There are cases when these indicators have gone beyond the average value of the analogues. Because of the commission this can be discovered in the early stages of the work and adjustments can be made. The advantage of the technical and economic commissions is obvious.

The creation of a more significant scientific stockpile forces the NPO to expand cooperation with academic and branch scientific research institutes, VUZ personnel and planning organizations. We are assisted in solving problems of scientific and technical progress by 52 scientific research and planning-design organizations in the country. Among them are three institutes of the UkrSSR Academy of Sciences (in particular, the Institute of Electric Welding imeni Ye. O. Paton, with which we have had many years of long-term ties), 22 other scientific research institutes, departments of nine higher educational institutions, and 18 design and technological bureaus.

The creation of training scientific production associations (UNPO) on a public basis has contributed to the strengthening of the ties between science and production. Within the framework of the UNPO the departments of the VUZer and the divisions of the associations conduct joint scientific research work and organize creative brigades for long-range developments. One of the important aspects of the activity of the UNPO is the training of skilled engineers who are oriented toward work in our association. The cooperation is carried out with 15 departments of two Odessa VUZes--the polytechnical and technological. Beginning with a 4-year course in these VUZes target groups are created for the specialties of our NPO. Their students go through their practice training at Kislodmash and special courses and faculty-supervised sessions, and they work on course and diploma projects under the leadership of our leading specialists (more than 50 of these diploma projects are being defended this year). The young specialists, once they have completed the VUZ, come to the collective prepared to solve those problems which face our association.

Accounting for the Results

Reliable accounting and control are necessary in order to obtain real savings. For the scientific and technical services and for the original proposals of the workers our main accounting document is the certificate of introduction of the measure or proposal. It is filled out by the party responsible for

performing the work (shop or division). The actual savings that are achieved are calculated according to the various elements of expenditures from the introduction.

Operational control of the introduction of measures in the association is provided by the sector for organizational and technical planning and new technical equipment. It finds the certificates of introduction which are then approved by the deputy director of the Association for Economic Problems.

The production divisions receive materials from technically substantiated normatives calculated with a computer on the basis of limit charts. When the 3-month period comes to an end the shop still has the unutilized metal, and the division for material and technical supply must establish the savings. Only after this is it credited.

It sometimes happens, although rarely, that some shop or section does not manage to stay within the limit. This, of course, is an "extraordinary event." The association management decides whether or not to provide it with additional metal.

When introducing the system of control of resources we came up against a number of organizational and technical problems, above all, the need to improve accounting for the movement of material values.

There have been cases in which the shop managers have decided not to show the real savings they had achieved since they were not sure that in the warehouses they had provided for reliable storage, accounting and control of metal, especially costly nonferrous metals. Well-insulated warehouse facilities are necessary for this. We began first to put the warehouses in order both for the plant and for the largest consumer of metal--the metallurgical shop. At the same time we carried out mechanization of the warehousing and the changeover of the supply of shops to centralize transportation of materials, and we introduced an automated system of accounting.

During past years the plant has constructed several large and small warehouses for storing various materials and blank pieces, particularly a section for centralized storage, preparation and issuance of welding materials. This section makes it possible to save on materials which are in short supply and to considerably improving the quality of welding, which is especially important for us since the association produces vessels on which the Gosgortekhnadzor places increased requirements for durability and safety of operation.

Apparently many enterprises which are serious about the problem of thrifty utilization of resources come up against the need to improve the warehouse complex. The development of warehousing frequently lags behind the development of the main production. Capital investments for these purposes are unjustifiably meager. Mechanization and automation of warehouse complexes and the provision of the necessary space for them constitute a crucial problem.

Stimulating the Economy

The system of resource management should be reinforced by effective methods of material incentive. The reduction of labor-intensiveness is a most important constituent part of increasing labor productivity, which is the main fund-forming indicators. But during the past period we have made the material incentive fund for the shops directly dependent on the level of material expenditures. Beginning in 1983 deductions from the sum of savings achieved as a result of reducing the expenditure of materials has gone into the material incentive fund. When the limit on expenditures increases the deductions decrease.

The bonuses for the production subdivisions are calculated in an amount of 50 percent of the value of the saved materials and are paid (to workers--from the wage fund, to engineering and technical personnel--from the material incentive fund). This way the savings on metal resulting from the introduction of efficiency proposals are not included in the calculations for bonuses for the shops, brigades and sections. They are paid from the incentive funds for efficiency work and invention.

Reports on the limits of expenditures are the basis for calculating bonuses for the production collectives. The bonuses are paid once a quarter. It sometimes happens that the sum of savings is insignificant and the bonus is correspondingly small. In these cases the shops have the right to accumulate the bonus and have it paid during subsequent period. When the shop has an overexpenditure of metal it is obliged to make up for this from the savings that are achieved subsequently. Bonuses are not paid until full reimbursement is made for the overexpenditure. The shop chief is granted the right to withdraw bonuses or reduce their amount for production mistakes on the part of individual brigades or workers.

We have bonus provisions for salvaging wastes through improvement of their collection and processing, for expending the utilization of secondary resources, for collecting and turning in scraps and wastes of ferrous and nonferrous metals and--separately--wastes of valuable metals, and for return and repeated utilization of containers.

The source of bonuses for specialists of the association's scientific research institute is the incentive fund formed from increments for the output of new products and items with the Emblem of Quality. Consequently here as in other NPO's production and science have different sources and conditions for incentives.

The organizational unity of science and production and the community of goals which plays a large role in accelerating scientific and technical progress stand in contradiction to the existing system of payment and stimulation for labor. This is an important issue, on whose resolution the time periods for the creation of new items and the level of reduction of expenditures depend.

Public Support for the System

An important form of public support for the system is the so-called relay baton of effectiveness. The idea of it is this. The shops have instituted journals for registering proposals that are directed toward economizing on material, energy and labor resources. As they come in, these proposals are considered right in the shop by the head specialists of the association, and if a positive decision is made they are entered into the schedule for developments. For each proposal a deadline is established for execution, and the overall schedule for the introduction is posted in plain sight. Because of this policy for consideration of the proposals the time period for making a decision about the proposed innovation decreases, excessive red tape in documenting efficiency proposals is eliminated, and interesting proposals appear more quickly.

During the years of the 11th Five-Year Plan more than 2,000 people participated in the relay race of effectiveness. They submitted 706 proposals with an economic effect of 2.2 million rubles.

The cooperation between workers and engineering and technical personnel in creative brigades has had a significant influence on increasing the creative activity. There are 72 of these brigades in operation in the association. Combining engineering calculations with production experience turns out to be extremely fruitful. The time periods are reduced for introducing large technical innovations and possible mistakes in their planning and execution are prevented, as a result of which one achieves the maximum possible economic effect.

The association's social development is directed toward increasing labor activity. At the head plant a construction shop has been created which constructs both housing-domestic and industrial facilities through the internal method. On the association's grounds we have constructed a club, a water therapy facility, culinary and vegetable stores, a dry cleaner's, a drug store, a barber shop, a footwear shop, a sports facility and hothouses. The recreation base on the seashore is very popular. Our young families are almost completely provided with children's institutions. The Belosnezhka Children's Combine is the best in the city. Of course we'd have difficulties with housing, but we are constantly engaged in constructing it. During the year we introduce an average of two nine-story buildings.

Although the percentage of labor turnover in the NPO is not high (6.7 percent), the difficult situation with labor resources in the city forces us to devote special attention to youth and the future replacement for the collective--schoolchildren and young people studying in vocational and technical schools. We value the young people who have worked for us before going into the army and are interested in returning here after being discharged.

Induction into the army is an entire ritual. At the farewell ceremony each soldier is given an electric shaver and all the materials used in writing letters. For 2 years of service we calculate for all military servicemen the 13th wage, which they receive after returning to the enterprise. Komsomol

members write them letters and send them souvenirs for the holidays. One can understand the purpose--let them remember that people are waiting for them not only at home, but also at their job.

Many enterprises are now trying to enlist school graduates into production. We have decided to increase our contact with the schools through patronage work. The NPO has taken five schools under its patronage. A large shop supervises each of them. We have improved the organization of production training of young people and have tried to learn their interests and organize technical creativity groups. We conduct excursions and tourist trips. The NPO with all of its problems, concerns and interests is gradually entering into the life of the schools under its patronage.

During the years of the 10th and 11th five-year plans we managed to increase production volume 1.9-fold without increasing the number of people in the collective or the volume of consumption of material resources. All products produced by the NPO have either been modernized or have been replaced with progressive new designs. We have improved the technical and qualitative characteristics of the products and at the same time, reduced resource-intensiveness. The Emblem of Quality has been awarded to 80 percent of our items which are subject to certification. Products from the association are exported to 40 countries.

We are reducing the consumption of ferrous metals by an annual average of 6.3 percent while the assignment is for 4.7 percent, and nonferrous metals--6.7 percent instead of 3.7 percent. Of course, each year it is more difficult to achieve the savings since all of the large reserves which were on the surface have been exhausted. But if the work for economizing is conducted systematically, one can look optimistically into the future.

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ODESSA SYSTEM FOR ECONOMIZING DESCRIBED

Novosibirsk EKONOMIKA I ORGANIZATSIYA PROMYSHLENNOGO PROIZVODSTVA (EKO) in Russian No 7, Jul 85 pp 38-48

[Article by Ye. Lysaya: "These Practical Odessites"]

[Text] The System Insures Against Accidents

"It is possible to economize in various ways. It is possible to tighten one's belt and achieve an effect, sometimes quickly. But this is not a system. The Odessites, on the other hand, have turned out to be surprisingly practical. They have laid the principal foundations of a system which guarantees them stably economic management...." These words were said at the all-union seminar in 1983 devoted to the experience of Odeskislodromash by the deputy chairman of the All-Union Council of Scientific and Technical Societies, Dimitriy Mikhaylovich Levchuk. The guests of the Odessites who had come to the seminar from all parts of the country persistently questioned their hosts, trying to figure out the essence of the system.

"It is not always possible to obtain the necessary profiles of rolled metal and thus there is an overexpenditure which frequently 'eats up all the savings.' Does that happen to you?"

"We too sometimes have losses. But our system envisions the responsibility of the suppliers to make sure that the initial materials that are delivered correspond to the sizes of the blanks. If there is a replacement the division for material and technical supply is obliged to draw up a document for this and coordinate with the technological bureau the possibility of bringing the profile of rolled metal close to the size of the billet with the help of drawings (we have created a special drawing section at the plant). Thus we manage to save a considerable part of the metal. Under these conditions the amount of the bonus for the suppliers is still reduced, but insignificantly. But if as an oversight they have failed to ship some kind of metal altogether, then their bonus is decreased significantly."

Then the question which, as it were, hits the nail on the head: "But are you not afraid that they will cut your funds for metal?"

"Of course we are afraid! But almost every machine-building enterprise is receiving an assignment to economize by an average of 3-4 percent of the metal a year. We are reducing expenditures by 5.5-6 percent. Of course, before making any new decision or suggestion concerning economizing on material and labor resources, we weigh it from all sides and introduce it into the system. Then we are convinced that the solution will also produce a return in the future. The sources of the savings and the methods of calculating them are registered. This insures us against the factor of chance."

"With those work methods how do you manage to fulfill the plan for turning over scrap metal?"

"We did not fulfill it. It was adjusted for us by 490 tons when we confirmed with documents that the association was saving on the supplied metal as a result of using wastes."

"...But when walking through the plant grounds the chief of the metallurgical shop, N. A. Stefanovskiy saw that the experiment participants were fencing in their section with corrugated sheet metal."

"Where did they get the metal," he asked.

"They got it from the warehouse."

"Oh, it's too bad you did not come to me! I would have given you as much scrap metal as you want which is suitable for fencing."

"On the same day Stefanovskiy presented an idea at the directors' conference: to allot metal to the auxiliary services only with permission from the metallurgical shops. The director immediately got the point and supported the suggestion. Then the supply division will not receive a single order from the auxiliary shop for metal without a certificate from the chief of the metallurgical shops."

When a person begins to think in a particular direction he begins to notice possibilities of changes where previously everything seemed to be correct and unshakeable.

"Why does every machine assembly shop cut its own small pieces? Give them to us and we will cut them along with the large parts," suggests Stefanovskiy.

Technology is revised and metallurgical operations are concentrated. This is reflected in the provisions and normatives, which are immediately introduced by orders for the association and standards of the enterprise.

The Psychology of Economic Work

Nikolay Aleksandrovich Stefanovskiy is a native of Odessa and he completed the polytechnical institute here. But for some time he has been working in Sverdlovsk, at Uralkhimmash. The metallurgical shop at the Ural plant cuts 3.5 times as much sheet metal as Kislorodmash does, which makes it possible to maintain a large marking bureau: four engineers and eight draftsmen. Not a

single sheet of metal comes to the shop unmarked. There has not been any point in creating such a shop at the Odessa plant. The metallurgical shop here does not use that much metal during a day--only 35 tons. But the list of various kinds of blanks is immense. The cutters have sometimes produced 500 blanks of 100 various kinds during a shift. It is more difficult to solve the problem of efficient cutting. Stefanovskiy suggested first of all motivating the cutters and stampers to economize on metal. He organized competition and arranged for an increase in bonuses for efficient cutting. And the shop specialists along with the technologists began to select the blanks for the group method of cutting. It became possible to consolidate batches of parts and, as a result of this, save metal and organize accounting for it.

"Once a stamper brought me a thin little frame that was delicate like Vologda lace. 'Guess what I have cut up now?' he asked me. I thoughtfully turned over each part but could not imagine.' Well, all right, that happens, do not burst your brain. This is a sample cutting of one part for a turbogenerator and a small nail for the consumer section. If you approve, I will send the nails to the consumer goods workers now, and they will not complain any more because the container production is standing idle as a result of something as trivial as this,'" said Stefanovskiy.

People have developed a psychology for economical work. It is simply incredible that the same workers several years ago were throwing away hundreds of kilograms of metal after cutting.

The psychology of economical work is one of the results of the system of control of resources and at the same time it is an important factor which provides for success. It has changed the attitude of specialists of all subdivisions of the plant and institute as well as the nature of their contacts. Now a designer goes to the material and technical supply division to consult about whether or not he has selected the correct profile of rolled metal for a new machine: how much will it cost, is it in short supply? Previously the designers and supply workers communicated mainly when they had mutual complaints. The smoke rose to the ceiling. The supply workers accused the engineers of not knowing about real life, that certain grades of metal could be ordered only in certain cases, that the designer had no idea of reality.... And the developers refused the profiles of rolled metal that were offered to them and proved that to use them was the same thing as cutting size 44 pieces for a size 56 suit....

The metamorphosis in the psychology of the supply workers is so impressive that all the workers in the association are talking about it. Previously the chief of the supply division, Leonid Romanovich Geller, thought that his duty was "to deliver," "to take back" and "to replace." Now he is putting the management of material support for production on a new basis. He is demanding reconstruction of the warehouses: as long as the metal is out in the open I cannot avoid corrosion and guarantee savings." He is bringing the supply of materials for the shops of the plant into a centralized system. "There is no point in running to us with demands--we will ship everything ourselves on the basis of limit charts and schedules for operational production planning." He is going to the Odessa Institute of the National Economy where he graduated and agreeing on joint development of computer programs for the movement of

resources. "I cannot work blindly, I need analysis and predictions for the future," he declares.

"I do not have a single extra ton of metal," Geller explains. "I immediately obtain it from the Gosnab at a limit of 5-6 percent less than the planned demand: exactly the amount less which the association has earmarked saving."

Nor have the economic services ever before operated so closely with the technical services as now.

Inna Lazarevna Pelts, an economist, says: "Many workers in the planning and economics division completed the Odessa Institute of the National Economy and were pure economists. The head economist of the NPO, Igor Borisovich Kogan, forces us to look into the technical equipment and become familiar with the design and technological developments. It is more work, of course, but the figures in the reports and plans become alive, you work more intelligently, and you can insist on your opinion when analyzing the expenditures for a new item.

To be sure, frankly speaking, sometimes you still think: Why do I need to know the fine points of the design? "I am up to my ears in work anyway!" admits the chief of the price bureau Lidiya Vasilyevna Lenskaya. "Sometimes you will say sincerely:

'Igor Borisovich, this is not our work.'

'But is figuring out the price our work, and approving the certificate for introduction?'

'Well, yes!'

'Well, will you really be sure that the price suggested in the plan or the calculation of the effect is correct if you have not seen the development with your own eyes and know nothing about it?'

In general they can be convinced."

The contacts between the developers and the economists are especially difficult in the NPO, where the institute and plant are separated by the barriers of staff and the books, where the institutes have their own planning and economic divisions and bureaus of technical and economic justifications. If one achieves authority through administrative demands alone, one can hardly expect much. Kogan thinks that there is only path--to prove the competence and usefulness of the association's economic service. Therefore he himself tries to find out what is new in each machine and in each technological process that is developed and introduced, and he demands that all workers of the PEO know this. He has insisted on the creation of joint technical and economic commissions of designers, technologists, economists and norm setters for control over the material-intensiveness and labor-intensiveness of new and modern items, and he has convinced economists that it is necessary to generalize and to issue to the developers information concerning the level of

expenditures for similar items in the branch so that they will be oriented toward this when designing new models.

What Distinguishes the Administrative Crew?

At Odeskislodromash, regardless of which subdivision you may visit, everywhere you will get the impression of creative and competent work. Yet in the collective they speak of the general director as someone who is dull and excessively strict. In these cases the director's assistants are usually more disciplined performers than workers with initiative.

"The director can raise a fuss over any shortcoming," they say. "Sometimes the punishment is not commensurate with the crime."

"Yes, he is merciless when it comes to slipshod work, but like a radar device he is sensitive to everything that is new, although he never gives verbal praise. You did it, it turned out? That is the way it should be. Think about the future," others say.

"He is the most skilled formulator of problems," state the workers in the computer center. "The decisions for automating the system for control of resources are clear and convenient for translating into the ASU. He drops in to see us almost every day and he always has new ideas."

"I have been working with Boris Yevtikhiyevich Trinchuk for 18 years," says an engineer in the competition, Yelena Pavlovna Stupina, "and when I came to the plant it was his second year as director. I remember during the first period when he would sit around for hours in the evening with the two engineers--the designer and the technologist, whom he had selected as consultants, until they had figured out the specific features of production."

Usually a director is either a manager or a "technician." Trinchuk is a versatile manager and therefore can control all socioeconomic and technical processes (in 1979 he defended his dissertation and became a candidate of technical sciences), and, moreover, everything is important to him and he neglects nothing, even trying to solve questions of competition in a nonstandard and interesting way.

They say that he is abrupt. Yes, this is true. He is a strict manager and is not fond of sentiment. Externally he does not show his feelings, he seems closed off, but in fact he is very emotional and like all reserved people, he is subject to stress because he keeps everything within himself. Once the wind damaged the roses on the plant bushes and he went around gloomy all day long. And when a storm broke down about 15 trees he almost became ill.

The director is no less demanding of himself than he is of his assistants, and he has an incredible sense of duty. Once he gave an instruction to tear down an old two-story building which had no amenities in order to release the area for constructing a new residential building (the association constructs two nine-story buildings a year by the internal method). He moved the people for the time being and promised them apartments in the new nine-story building. And then the city refused to let him tear down the old building. He did not

know which one of the city and rayon managers had made one decision and which had made another. But this was not good for the director's health.... He did not calm down until the building had been restored and he had apologized to the head of each family personally.

"The director is a searching person," says the chief of the division for scientific and technical information, Zoya Nikolayevna Chernykh. "To be sure, our division receives special attention from him. Regardless of where he goes he always brings something new, asks his assistants to use it in the association, and he is very strict with us if the introduction of whatever it is goes poorly. Perhaps because his insatiable nature is always thirsting for something new, he loves to work with youth. He knows all of the schools under the association's patronage and has organized a 'day of the first classman,' which is at the beginning of the school year, and he has never missed a single one."

The injury, the pencil box, the flowers, the farewell speeches, the NPO director--these are not so much. But perhaps the very first recollections from school days will help to make a selection of where to go and work if the student does not intend to go to the institute after school. The UkrSSR Ministry of Education awarded Trinchuk the "Outstanding Educator" badge for his work with schoolchildren....

When you compare this information about the director, which seems contradictory at first glance, you begin to understand why people have been working here for 10 years, and why almost everyone around the director has his own personality. As someone who is searching, Trinchuk prefers to see the same kind of people around him. He is too abrupt for indifferent or ungifted people. He rarely praises people with initiative and energy, but he always supports them.

It is possible to disagree with the director if he is wrong and it is possible to insist on one's own opinion if one believes that a suggestion is reasonable. Opinions are expressed frankly and decisively. In such a situation it is easier to clarify the administrative truth.

"Just as it is for the crew of a space ship, though it is true for management that it is necessary to select people who are psychologically compatible," says the chief of the institute's technological division, Valeriy Nikolayevich Sokolov. "I think that such a management 'crew' has now been formed in the association. The people are joined together by common concerns and a creative attitude toward business which in the NPO has become the main criterion for evaluating a specialist."

Who Pays?

The system for managing resources is not yet firmly in operation. Its organizational principles are operating actively, but the feedback and the incentive, which comprise one of the main regulators, are not sufficiently felt. Only the workers of the metallurgical shop actually feel the influence of the incentives because they receive 50 to 75 percent of the value of the metal that is saved. But this is not the case in all shops. Not every

manager is willing to show the actual complete savings: for the surplus metal has to be released to the supply division.

The former chief of Shop No 3 frankly admitted (now he has been transferred to the NPO institute to the SAPR division) that he preferred not to pay the bonuses as long as he could avoid reflecting the savings in the report. The materials are expensive (the shop has to use many nonferrous metals and cable) and there is no confidence that all of them will be saved since the shop does not have its own warehouses.

Other shop managers are also unwilling to show their savings. The functional services of the association are more allies in this than opponents. The chief of the division for labor and wages questions every draft of an order concerning savings which he has to certify because the bonuses for the workers come from the wage funds and the personnel workers have their own reasons: if you give out more funds for bonuses you might have an overexpenditure on the wage fund.

Insurance? Yes! In some cases it is dictated by the fear of undermining the supplies of metal, and in others--the wage fund. As a result, one fails to take advantage of an important social factor--the workers' initiative.

It is also difficult to convince the developers of technology and designs that they have incentives for economizing since the institute has no special systems of bonuses for economy. The results of the utilization of resources are "tied up" to incentives: if one does not fulfill the assignment for reducing material-intensiveness or labor-intensiveness, the amount of the bonus is reduced, and if these are overfulfilled, it is increased. But these indicators are only taken into account, and do not determine the system of bonuses. The source of the funds for incentives is the same as it was before--deductions into this fund for the output of new technical equipment and increments to salaries for products with the Emblem of Quality. Therefore the absolute amount of the bonus cannot be increased. Because of the unflexible wages, the scientific and engineering corps of the NPO end up the losers. The leading developer with a large amount of tenure in the design bureau will go to work as chief of an automotive base. Another one of his colleagues will become a painter. "I do not like the wages and I do not want to get earnings 'on the side,'" he explains. Some of the engineers transfer to the shop as ordinary workers. This is another manifestation of this kind of practicality. But it is not the worst. Managers of the NPO consider it predictable since they cannot provide a higher wage level. They do not turn to those extreme measures which have long been utilized at many enterprises--they do not issue orders prohibiting the transfer of engineers to positions as workers, thinking that "he who wants to dance must pay the piper...."

"So far the incentives have not been developed as well as other aspects of the system for managing resources have," admits Igor Borisovich Kogan. "This is our fault and we suffer for it. Regardless of how much one might pay for savings, it would be advantageous in any event if one were to calculate the cost to the state of each unit of resources. But the national economic effectiveness should not enter into contradiction with the effectiveness of

concrete production. We need good standard methods for providing incentives for savings and a special source of awarding bonuses for them."

Today's Concerns and Tomorrow

"For significant development of the production of modern machines without increasing the consumption of metal, the Order of the Labor Red Banner is to be awarded to the Odeskislodmash Scientific Production Association."

--An order of the Presidium of the USSR Supreme Soviet

"The ispolkom for the international prize The Golden Mercury, at the suggestion of the USSR National Committee, awarded the Kislodmash NPO the international prize The Golden Mercury for its essential contribution to the development of the national economy and international economic relations."

--(From a telegram of the ispolkom for the international prize The Golden Mercury to the general director of the NPO)

International awards, orders, medals and certificates of the VDNKh--these are today. But there are new problems in the future, and many of them. The more we have done, the more clearly we have seen that it was not done right, that it has to be done over. Such is the dialectic of progress. Because of paying greater attention to the organizational reserves for economizing, we have lost sight of certain of tomorrow's concerns.

"I am embarrassed to appear before our guests. They have come to see something advanced and I only tell them about the system, trying to avoid the sections, trying not to show them how crowded we are or to show them our old equipment," the chief of the metallurgical shop, Nikolay Aleksandrovich Stefanovskiy, put it bluntly at the directors' operations meeting. "I will not try to justify myself before everyone. 'We are good people; in 10 years we have more than doubled the volume of production using the same space without any capital investments.' It is time for us to accelerate reconstruction and install new machines for thermal cutting. The designers of these machines can see where things are not right and what must be done."

A plan has now been created for reconstructing the metallurgical production. The machine assembly shops are now being technically reequipped, flexible production systems are being developed, and new machine tools with numerical program control and processing centers are being installed. Attention has been firmly fastened on the future. But it will be easier to deal with it because the system of management of resources has helped to bring order into today's work.

The deputy chief of the All-Union Industrial Association Soyuzkriogenmash, R. I. Yefimanko, says:

"They are taking advantage of the experience of the Kislodmash workers at 136 enterprises, including at 66 percent of the plants of our ministry of petroleum and chemical machine building. This experience has gone beyond the framework of work for economizing on resources. In principle we are speaking

about joint work of designers, technologists, economists, supply workers and laborers for creating highly effective production which makes it possible to manufacture new equipment on a high level with minimal expenditures. Its value lies in the overall system and the comprehensiveness of the work."

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DESIGNER WORKS FOR ECONOMY

Novosibirsk EKONOMIKA I ORGANIZATSIYA PROMYSHLENNOGO PROIZVODSTVA (EKO) in Russian No 7, Jul 85 pp 49-54

[Article by N. V. Samusenkov, NPO deputy director for scientific work: "The Designer and Economy"]

[Text] The technical and economic substantiation of a new item has always been an important part of design work. It is another matter when the designer, engaged in embodying his own technical idea, has sometimes not been so careful when considering the expenditures on the machine. But since they have started to give design subdivisions assignments for reducing material-intensiveness and labor-intensiveness, their attitude toward economizing has gradually changed. The style of design thinking has always changed. Now a developer, regardless of now attracted he may be by a technical idea, will always remember the economic side of the plan.

Of course the psychology did not change immediately. At first the need for deeper development of the economic characteristics of the machines was perceived as some kind of limitation and a frustrating hindrance. The adjustments made to the system of organization and management of developments and the methods for incentives helped to change the attitude toward the economic aspect of the developments.

What are organizational innovations? The reduction of material-intensiveness and labor-intensiveness is planned for the institute as a whole and for each of its four divisions. One of them is the design division for basic production, which is called this as distinct from the design subdivisions which are engaged in the development of sittings, adapters, means of automation and other designs which provide for the application of new technological processes. Its proportion of the overall volume of development in the institute amounts to 20-25 percent. The leading designers of plans or leaders of groups along with their collectives are to make suggestions for reducing expenditures, which are included in the overall organizational and technical plan which is approved by an order for the NPO and is monitored.

By an order for the NPO a technical and economics commission is appointed for supervising each development. Its task is to analyze economic indicators in all stages of planning and production of the item and to take prompt action to

improve them. The designer must defend before the commission such indicators as the weight of the item, the proportional material-intensiveness, the technological nature of the design, the coefficient of the utilization of metal and the proportional labor-intensiveness. Only after this is the design for the item submitted for approval to the scientific and technical council of the association.

The functions of the commission do not end after the plan is approved by the scientific and technical council; rather they just begin then. In all stages of the development of the item the commission considers the extent to which the results that are achieved correspond to the planned results. There have been cases in which it has been necessary to rework the design or individual solutions if the indicators of the expenditures have exceeded the proposed average values. But because of the system of control and analysis, this has been done in the early stages of planning and with minimum losses of time.

The creation of such technical and economic commissions is expedient, in our opinion, also in those cases where the enterprises do not have their own design subdivisions, but produce items from the designs of outside organizations. When they include indicators of resource-intensiveness in the technical assignments for the development of items, through these commissions the clients can control the extent to which the designs for the new machines provide for the fulfillment of the directive assignments established by the enterprise for reducing material-intensiveness as well as the norms for the expenditure of materials.

For a reference point the economic service of the NPO supplies the designers with information about individual expenditures of the basic materials which are required for the item. Branch normatives are given as well as the highest amounts which are planned by the association. Of course it is not always possible to obtain this information, especially when the design has some principal innovation. We are poorly provided with foreign information regarding these indicators. Nonetheless there is a point of reference which contributes to expanding the economic horizons of the designer.

Every one of our leading designers, group managers or designers of the first category is free to use concrete savings in his area of developments and is familiar with methods of obtaining savings when designing machines and installations.

One of the most indicators reflecting the result of the economic research of the designer is the coefficient of the utilization of metal. In the stage of working designers the developer indicates the proposed coefficient on all blueprints of parts and assembly units. In our opinion, the coefficient of the utilization of metal is a compass in the work for reducing material-intensiveness. It reflects not only the level of the design, but also the level of the technology because, although the designer designates the coefficient, the permission to continue is given by the technologist. He must check to make sure that there has been no mistake during planning and provides for the achievement of the coefficient by the new technological decisions. Thus in the planning of the coefficient lies the juncture of the interests of the designer and technologists and, because of this, also the control center.

The proposed design decisions, which contributes to reducing material-intensiveness, is documented by a notification of change. After the obtaining the results of the introduction, the sector of the organizational and technical plan notes it in the card catalogue. A document is drawn up concerning the introduction of the measure and changes are made in the technological and labor normatives. The information is transferred to the computer center and to the data bank for the design and technological composition of the item.

The document for introduction is the main document for monitoring the reduction of expenditures of materials and labor as a result of design and technological decisions and it is the basis for incentives for the work that has been done to reduce resource-intensiveness.

Still I wish to emphasize that the reduction of resource-intensiveness is not to the detriment of indicators of quality and reliability. This is shown by objective data from an investigation conducted by the USSR State Committee for Science and Technology. It confirmed that this equipment is on a modern level and corresponds to foreign analogues. The Emblem of Quality was awarded to 41 items--80 percent of the products subject to certification.

Our air distribution installations are valued highly on the foreign market and people are glad to purchase them. But certain kinds of machines for thermal cutting do not satisfy modern requirements. Up to this point we have not produced machines which use photocopy systems. We are now creating a machine with numerical program control and microprocessors. But it is difficult to handle the orders for electronic systems. Neither the Ministry of Instrument Making, Automation Equipment and Control Systems nor the Ministry of the Electronics Industry is interested in small batches of items. When they reject the orders they refer to the fact that the conditions under which the program devices will have to operate do not meet the requirements for their operation. Indeed, in the metallurgical shops in which the thermal cutting machines are used the conditions are not as stable as they are in machine processing shops where machine tools with numerical program control operate. The changes in the temperature are greater here, as are the dust and gas pollution. It is necessary to seal off the blocks for the programming devices. In any event they are created better in specialized branches. But since we have not managed to find anybody to produce them, we have had to organize our own electrical installation section where we do everything, right down to the printed plates. In terms of the speed of cutting and the thickness of the cut our machines are just as good as the best foreign ones, but in terms of the supply of microprocessor equipment, we will have to catch up with the leading foreign firms.

The most appreciable results for economizing on resources in the state of design are achieved as a result of the utilization of the latest achievements of science and technology. The NPO has established long-term creative ties with 52 scientific organizations and VUZes of the country. The cooperation is carried out on the basis of two types of agreements: for socialist cooperation and economic agreements. As a rule, the contacts begin on the basis of agreements for socialist cooperation and when it becomes clear that

they can produce a real effect, an economic agreement is filled out. A mandatory condition for financing scientific research work is that the ratio between the effect and the expenditures be no less than 3:1.

Scientific research and experimental design work in the NPO are organized in keeping with the enterprise standard, The Policy for Conducting and Receiving Scientific Research Work and Experimental Design Work. The standard encompasses the rules for planning, the standard stages for conducting the work, the methods of control, the forms of the report documents, the policy for considering the results of scientific research and experimental design work and the arrangement of production of the new item.

What are the main ways of economizing on metal when developing designs? These include improving the technological and kinematic systems of equipment, eliminating increased reserves of durability of individual components, and concentrating capacities and increasing the productivity of the item, as a result of which the metal-intensiveness per unit of capacity decreases.

When research is conducted jointly with scientific research institutes and VUZs an overall program of work is drawn up and general creative groups are formed. Therefore the research has a direction and is of an applied nature, and the cycle of "science-production" is reduced to two-thirds to one-half. The ordinary duration. Thus the new air distribution insulation which uses liquids and is to be used in combination with equipment at atomic electric power stations, which produces 500 kilograms of liquid oxygen or nitrogen an hour, was created in 2.5 years. Previously this would have taken 4.5-5 years. Comprehensive cooperation is especially effective with various groups of institutes and design bureaus when they are solving complicated technical problems. This is how it was done, for example, when modernizing the heat exchange installations.

The All-Union Scientific Research Institute of Helium Equipment suggested new technical solutions at the level of inventions and carried out the calculations. We used their theoretical developments but designed and manufactured our own fittings and equipment. We developed jointly the design for the heat exchange equipment which is reinforced with wire and manufactured an experimental model. Because of the wire ribbing, the metal-intensiveness was reduced to two-thirds the ordinary amount. The plant allotted us space in the shop for experimental production as well as skilled time-rate workers who were not bound by piece-rate norms and could concentrate on the assimilation of the new item. All this made it possible to accelerate the introduction threefold.

In streamlining the consumption of resources we attach a great deal of significance to certifying the product for material-intensiveness and predicting the norms of metal-intensiveness of the items using statistical methods.

In the scientific and technical council, the NPO has created a section for certification for metal-intensiveness. It organizes work groups which engage in analysis of the material-intensiveness of designs, components, and parts for various kinds of products. On the basis of the analysis we either fill

out a document certifying the item for its material-intensiveness or make a decision to modernize it if it is to be removed from production in the near future.

Modernizing the equipment that is produced is one of the leading directions in our work for economy and thriftiness. During the past 7-8 years, as a result of assimilating new items and modernizing equipment that we produce, we have managed to fully update our products.

The designers and researchers study the prospects for reducing material-intensiveness. The research is carried out in the following areas:

development and utilization of metal substitutes, the application of parts made of metal powders;

the creation of programs for optimizing calculations of technological systems of calculations, kinematic systems and cyclograms for their operation using electronic computers;

the development and utilization of machine programs for optimizing designs in terms of mass and sizes of standard components and equipment as well as their calculations of their durability and dynamics;

unification of parts, items and assembly units.

Such an approach to developments requires a higher level of skills of the designers and increased responsibility. Yet the conditions for their wages remain the same. A love of their work in the sense of their own worth cause the developers to create good designs, but there are no other incentives. Not everyone is satisfied with this. It is offensive when skilled specialists leave the design division for other work. Problems of improving the organization of the labor of designers and their wages are bothering others besides us. At the present time they are very crucial and, in my opinion, deserve a separate discussion.

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TECHNOLOGIES SAVE ON RESOURCES

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[Article by Yu. N. Mashnev, chief of the scientific research laboratory of NIITKriogenmash, and A. S. Starets, candidate of technical sciences, deputy head engineer of the association: "Resource-Saving Technology"]

[Text] Our NPO typically has small-series and medium-series production. And this determines the specific nature of the application of resource-saving technologies. The best known of these--cold extrusion, cross spiral rolling, rotational or radical compression, rotational or radical compression, hot pressing and several others which are effective in mass production--are not advantageous under our conditions. Therefore the question is this: which resource-saving technologies are economically expedient for us? Which of them can provide for increased labor productivity, economy of metal, universality and low cost of instruments, automation and mechanization of equipment, light weight and rapid readjustment, and high precision and quality of the blanks that are obtained?

By conducting a careful analysis of the list of items, we have decided upon the following effective areas: drawing cylindrical and shaped blanks, cross wedge rolling; waste-free cutting of metal; and special technologies.

Why has drawing--a process widely known and applied in metallurgy--turn out to be more effective for us than certain modern methods? We do not see why this process is so little used in machine building. It could be extremely useful at many machine-building enterprises.

Take our situation. The NPO consumes 2-2.5 tons of individual brands of steel and profiles of rolled metal. And the norm for shipping ferrous metals by rail transportation is no less than 20 tons. Since we use rare alloys, the oblast metal base cannot provide for cooperation with us. As a result we must either take 20 tons instead of two and pay the bank 6-7 percent of the cost of the metal for above-normative supplies (and then it will rust and become unusable) or introduce plant limitations on the materials that are applied, that is, depart from the expedient sizes and profiles of rolled metal. The NPO, like many other machine-building plants that engage in small-series production, has taken the second path. As a result, allowances for processing

parts have increased, labor-intensiveness has increased, and it has been necessary to introduce rough (rough-grinding) lathe work. The metal has gone into shavings.

By applying the process of drawing we have increased the precision of the blanks, reduced the volumes of mechanical processing of the parts, increased labor productivity for their manufacture 2-2.5-fold and saved up to 30 percent of the ferrous and nonferrous metals. Practice shows that the creation of sections for including this work is especially effective at machine-building enterprises that are distant from the country's metallurgical centers.

The research conducted by our institute at six plants of the Soyuzkriogenmash VPO showed that the introduction of drawing can provide for a savings of 858 tons of ferrous and nonferrous metals a year, can reduce the labor-intensiveness by 152,000 norm-hours and, as a result of this, can release 76 workers and 38 metal-processing machine tools (with two-shift operation). At our NPO, for processing parts of the first section (150 kinds) by the drawing method the labor-intensiveness was reduced by 26,200 norm-hours, and 13 workers and six machine tools were released. With an expansion of the range of parts processed by this method (more complicated and shaped profiles) the labor-intensiveness will decrease by another 35,000 norm-hours.

It is possible that such drawing sections need not be created at all machine-building plants. Apparently in individual cases it is expedient to have cooperation among several plants or the creation of drawing sections at oblast metal bases. In each case a precise engineering and economic calculation is needed: which variant is more advantageous? After all, in each city there are dozens of custom tailoring shops in operation right next to the sewing factories! Both are necessary. The drawing sections would be like those shops, which could work the metal "according to the shape desired by the client" and prepare it for the specific needs of production.

Cross-wedge rolling has turned out to be an effective resource-saving technology for our association. Analysis of methods of forming and shaping has led us to the conclusion that this method can be used here for processing parts like the "multistage shaft." Initially we selected 143 kinds of parts out of 1,800 which could be manufactured by the cross-wedge rolling method.

Labor productivity with cross-wedge rolling increases 5-20-fold as compared to precision work on automatic lathes and the coefficient of metal utilization increases to 0.9-0.97 while the average branch coefficient is 0.71. One roller releases 18 lathes and nine machine tools operating on two shifts.

In order to increase the effectiveness of cross-wedge rolling it is necessary to provide for sufficiently large series of the parts that are being processed. Simply because certain parts of the "multistage shaft" type are not significantly different in terms of diameter and length of the stages, they could not be rolled. The designers have unified them and adjusted the blueprints of the parts involved with them, and after this they developed the technology and introduced into production the process of rolling unified blanks.

Unfortunately, the process of cross-wedge rolling is not being introduced extensively enough yet. Not many more than 60 enterprises are using it. Its dissemination is being impeded by the lack of equipment and specialists. We have had to create our own automated complex for cross-wedge rolling. In our opinion, one of the machine-building plants should be specialized in the production of this equipment.

The development of special technologies in the NPO is related to the fact that we are creating equipment which will have to operate under extreme conditions--with extremely low and very high temperatures. We have used a great deal of silver for soldering the containers. We managed to reduce its expenditure to two-thirds the previous amount by introducing nonsilver solder which was developed by the All-Union Scientific Research Institute of Autogenic Machine Building. Our specialists in conjunction with those who developed the solder have created a new soldering technology.

A decisive prerequisite for accelerating introduction of progressive technologies is improvement of the technological preparation of production and the creation of a system of automated planning (SAPR) of technological processes. At enterprises with single-unit and small-series production for many years there was the opinion that detailed technological documentation was neither possible nor necessary here. It was thought that with small batches of items, frequently replaceable ones, and with an absence of mass production processes one could simply write down the technological route of the movement of the parts through the shops.

The lack of detailed technological decisions was compensated for to some degree by the high skills of the machine tool operators who were working on universal metal-processing equipment. The fact that 15 percent of their shift time was used for becoming familiar with the blueprints and the assignment was considered to be quite logical. But it is possible to put up with this only when there are enough machine tool operators. Today when there is a critical shortage of them such losses of working time are inadmissible. It is necessary to take into account the fact that equipment has become considerably more costly and complicated and each hour during which it stands idle costs several times more money. Finally, there are a whole number of fine points of technology which individual workers may not be familiar with if they are not pointed out during the technical process. Sometimes, for example, it is necessary to reject an item simply because some part was not annealed. Therefore we hold the firm position: each technological process must be carefully prepared, and on the basis of this it is necessary to deliver from the instrument storehouse to the work station everything that is necessary according to this technology. Then the machine tool operator will be able to go to work without wasting any time.

Automation of technological planning makes it possible to reduce the cycle of preparation for production to one-half to two-fifths the ordinary duration and to relieve technologists of 80-90 percent of the routine work.

We began to introduce the system of automated planning of technology at the association in 1975 and we have been constantly expanding the sphere of its effect. We have been using it to plan operational and route technology, and

we develop part-by-part and consolidated norms for the expenditure of materials. We apply the SAPR for developing the technology for mechanical processing of parts and stamping. The Kriogenmash NPO is introducing the SAPR principles we suggested for planning technology for boiler and welding work. Thus automation of the planning of technology has encompassed the processes that are most typical of our branch. We do not have SAPR for technological processes of assembly and instrument production, but we are working on this.

Developments from our NPO are being used by 50 enterprises of various branches. Frankly, the NPO and its institute are the head ones for the problem of automation of planning technology. On the basis of the SAPR and machine tools with numerical program control, we have begun to create flexible production systems.

The introduction of the SAPR is inseparably related to the development of waste-free and reduced-waste technologies. On the basis of this we are developing efficient methods of cutting materials and preparing assignments for the metallurgical shops with the help of computers; a data bank concerning production wastes is being created.

We are engaged in optimizing the cutting of materials at all levels. The first level is during technological preparation of production. But at this time we are not sure of the structure of the plan in metallurgical production. The second level is optimization of cutting taking into account the plan and, finally, the third is optimization taking into account all of the materials and orders that have come into the shop at the given moment. The savings on the metal is also achieved as a result of applying group methods of cutting. Efficient cutting saves about 80 tons of metal a year.

A great deal of attention is devoted to the search for and utilization of reduced-operation technologies. Thus the new technology in special equipment for fastening plates--important parts of air distribution installations--made it possible to replace 11 operations which were previously performed by hand at four work stations with one single mechanized operation.

The spreading of resource-saving technologies is inseparably related to the introduction of collective forms of labor organization. They encompass more than 60 percent of the workers. The creation of the comprehensive brigades for the final product, as a rule, is accompanied by large-scale organizational and technical measures. Here is a typical example. When organizing a comprehensive brigade for producing the most complicated of our items--expansion turbines--a closed object section was organized. We managed to concentrate all the equipment on a relatively small territory. The result was not slow in being manifested. The production cycle was reduced to one-third, seven people were released and 100-percent rhythm was achieved in production.

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LABOR INITIATIVE AND STATE STANDARDS DISCUSSED

Novosibirsk EKONOMIKA I ORGANIZATSIYA PROMYSHLENNOGO PROIZVODSTVA (EKO) in Russian No 7, Jul 85 pp 58-61

[Article by N. P. Olandyrev, lathe operator, and A. V. Mironenko, brigade leader: "GOST's and Workers' Initiative"]

[Text] N. P. Olandyrev, lathe operator: The system for resource management (SUR) which has been created in the association, in my opinion, is valuable because it directs all of the efforts of the collective toward obtaining a real savings. Additionally, by raising the level of responsibility it causes the managers and specialists to be particularly careful. If the savings is registered it is necessary to change the normative for the expenditures of materials per ruble of output or for some specific or else the limit on materials per calendar period in the shop. Consequently, everyone who is responsible for material expenditures, beginning with the section foreman or the shop chief, tries to make sure that the savings are guaranteed.

I think that certain of the GOST's are among the limitations which impeded the utilization of the reserves of workers' initiative. In the normative reference works for the processing of metal extremely large allowances for processing are envisioned in metal cutting. This is frequently the case. I can take a part or a blueprint and see that the billet could be closer to the weight of the item. Less metal would have to go to shavings and the labor-intensiveness would be decreased. I try to show this to a technologist or the shop management and they refer me to a GOST. And there the allowance for processing is clearly too great.

To some extent the technologist is right when he says: "The minimum allowance is all right for you since you have experience and skills. But if the work were to go to a young machine tool operator--he could spoil the part if the tolerance were smaller!" I do not deny that such a danger exists. But let us look for a solution together! It seems to me that it is not so complicated: simply do a better job of organizing the transfer of experience and the labor techniques of skilled workers.

For example, I changed the method for processing brass half-rings and the wastes of the costly metal were reduced by 30 percent. And labor productivity increased, but the quality of the parts did not deteriorate. The GOST

stipulated a 5-millimeter tolerance, and we made it 1 millimeter. Now instead of 10 half-rings, we receive 15 from one blank.

Fluroplastic is difficult to process. We have revised the method for cutting it and suggested a special cutter for processing it. Now 70 percent of the material is put to work, while previously only 10 percent was. I was paid for the suggestion as a participant in the relay race for effectiveness, but they did not calculate the actual savings, referring to the fact that it is impossible to change the GOST for processing fluroplastic. Incidentally, because of this I was deprived of the remuneration for the actual savings since if it were completely accounted for I would received 50 percent of the cost of the fluroplastic. Or take brass supports. A large tolerance is allowed for their processing. We have suggested reducing it. The suggestion was approved, but changes have not been made in the blueprints or the technology because of the same reasons.

Perhaps I am especially aware of this since I grew up in the country and began to work as a tractor driver. Sometimes the tractor would break down and we would begin to repair it but there would be no materials. There every little brass ring was worth its weight in gold.

Of course our suggestions will not produce a large savings as compared to a revision of the design or the introduction of new technological processes, but still they should be taken into account and the tolerances for processing should be revised.

A. V. Mironenko, brigade leader: the GOST's that are in effect were apparently drawn up at a time when there were more materials, the machine tools were less precise, and the workers were not as skilled. There is one more important aspect: we are now extensively introducing brigade methods of labor, and in each brigade there is always a skilled machine tool operator at the side of each young worker. The mentors will always help the newcomers and suggest to them how to process the parts. And therefore whether or not the GOST is changed, we will still make sure that everyone in the brigade masters an efficient method of processing the part.

We have comprehensive brigade which produces the final product and includes machine tool operators and fitters. We manufacture expansion turbines, beginning with processing the parts. Interreplaceability has been developed in the brigade. The machine tool operators have mastered fitting work. They can see where the parts they manufacture go and whether or not they can be processed differently. We ourselves try to write out the technology if one of our experienced workers has thought of something new. We have a journal in which I enter the description of the technology. Frequently we attach a drawing to the description.

I think that the GOST's should be refined, the allowances should be stricter and we should avoid overinsurance when utilizing standards.

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COMPETITION GIVES INCENTIVE FOR THRIFTINESS

Novosibirsk EKONOMIKA I ORGANIZATSIYA PROMYSHLENNOGO PROIZVODSTVA (EKO) in Russian No 7, Jul 85 pp 62-69

[Article by N. K. Loyko, candidate of economic sciences, senior scientific associate of the Institute of Economics of the Academy of Sciences of the UkrSSR (Kiev): "Competition for Thriftiness and Barriers on Its Path"]

[Text] Special Forms of Competition

Public reviews and competitions comprise a widespread form of competition for economizing on material resources. But they cannot replace the special forms of competition for economy and thriftiness which are based in the planned assignments for economizing on resources, compared indicators of competition, regularly summing up the results, and an efficient system of material and moral incentives.

The effectiveness of special forms of competition for thriftiness is confirmed by the experience of the Odeskislodmash Association. Here it has become an important element in the system of management of the savings on resources. Socialist competition has been organized at all levels of production management. Indicators and criteria for evaluating the results have been developed for each level. Thus at the level of the enterprise the generalizing indicator is the assignment for economizing on metal; for workers of the design bureau--reducing the metal-intensiveness of a specific item; at the level of the metallurgical shop--assignments for economizing on metal as a result of efficient cutting and reduced waste; and at the work station--the assignment for economizing on metal in a given operation.

Attention should also be given to the experience of the Northern Donetska Azot Production Association. According to the conditions of the competition for economy and thriftiness, the only collectives of shops and sections that can participate in it are those which have approved assignments for economy and a reliable account of the expenditure of electric energy and raw material.¹ On the basis of the indicators of the meters installed in the shops, the association's computer center gives daily information about the expenditure of all kinds of raw material and energy as compared to the norms for the subdivisions of the association. Competition between the shifts has been .pa

organized within the shops. Personal accounts of economy are filled in daily according to the information from the computer center.

But, as materials from an investigation of the enterprises and associations show, the development of expedient forms of competition is being impeded by serious shortcomings. Among the subjective impediments one should include cases of a formal approach. A number of enterprises have not developed indicators of the competition specifically for brigades and individual work positions, they have not organized accounting for the savings and they do not use levers to stimulate the creative initiative of the workers.

The objective factors that have a negative influence on the development of competition for economy and thriftiness are shortcomings in planning and the economic mechanism, the shortage of measurement instruments and so forth.

It should be noted that even in places where expedient forms of competition for economy and thriftiness are developing the commitments are made mainly for reducing expenditures of material and fuel-energy resources. They rarely include points concerning thrifty utilization of equipment or instruments. Yet economizing on implements of labor is reflected in the final analysis in the economy on material resources. Therefore the example of Odeskislordmash, where a great deal of significance is attached to this reserve for reducing expenditures, is extremely instructive. Here the commitments for economy necessarily include points concerning effective utilization of their own equipment, reducing the normative for recouping it and reducing expenditure of instruments.

Improvement of Planning--The Basis of Competition for Economy

Certain indicators point to wastefulness in the utilization of resources. For example, the planning of the production of paper, sheet steel, pipes and other products in tons does not motivate the collectives to reduce the weight of the given products since this leads to underfulfillment of the plan.

Increased scientific substantiation of the plans and deeper disclosure of production reserves depend on the level of the normative management at the enterprise. Norms and normatives perform their functions and can save on materials when they are progressive and technically substantiated, that is, developed taking into account the latest achievements of science and technology, changes in technological processes and organizational conditions for production, and advanced practice. At Odeskislordmash a great deal of attention is devoted to the organization of norm setting for materials. Part-by-part norm setting for the expenditure of materials, calculation of the need for materials in the computer center and the establishment on this basis of limits for the shops and sections, the issuance and control over the expenditure of materials on the basis of unit limit charts, stimulation of the best results on the basis of reliable data from efficiently arranged accounting--these factors explain the high results achieved in reducing material-intensiveness in the NPO.

Yet at other enterprises there are many outdated, experimental-statistical norms for the expenditure of resources. In a number of cases the norms are

revised not annually, but once every 5-10 years. The result is an artificial shortage of resources, uneconomical, wasteful expenditure of them, and imaginary savings. For example, according to data of the Head Scientific Research Information and Computer Center of the UkrSSR Gosplan, of the overall number of norms and normatives for the basic production in 1981 0.7 percent were updated for enterprises of the UkrSSR Ministry of Heavy Construction, 3.7 percent in the UkrSSR Ministry of Sovkhozes and 5.5 percent in the UkrSSR Ministry of the Timber and Wood Processing Industry.

The assignments set for the enterprises and associations for economizing on metal are not always delivered to the shops, sections and brigades. The lack of these makes it impossible for the lower-level collectives to adopt socialist commitments.

One should attentively study and disseminate the advanced experience in reducing the metal-intensiveness of products, particularly the experience of collectives of enterprises of the electrical equipment industry in applying functional cost analysis (FSA) of products, the essence of which consists in comprehensive study of the correspondence of elements of the item or the technological process to their functional significance. The FSA makes it possible to develop the most expedient decisions for reducing the weight of an item, replacing costly materials with less expensive ones, reducing wastes during manufacture, simplifying the technological process of production, and so forth. For example, at the Kharkov Electrical Mechanics Plant dozens of items were subjected to functional cost analysis, as a result of which excessive material expenditures were reduced by an amount of 2 million rubles and the production cost was reduced by 10-30 percent.²

Improving the Organization of the Procurement of Metal Scraps

On the existing policy for planning the procurement of scrap metal contradicts the competition of the workers for economical and efficient utilization of metal. The more economically the metal is utilized, the fewer the scraps and the greater the probability of underfulfillment of the plan for the release of scrap metal and wastes, which will have a negative influence on the material and moral incentives for the collective.

The plans for the release of scrap metal and wastes are set for the enterprises and associations on the basis of the level reached in the preceding period and taking into account the rates of growth of the volumes of production of products during the planned period. As a result, they are frequently increased.

Enterprises and associations are not interested in searching out reserves for releasing scrap metal and wastes in excess of the plan since this increases the plan for the subsequent period and places them in a difficult position. On the other hand, since there is strict material and moral responsibility for failure to fulfill this plan, the economic organizations are forced to fulfill the plan at any price. Frequently in order to do this they throw away materials, fittings and spare parts which are still suitable for youth, which causes significant harm to the state.

According to data of the Institute of Socioeconomic Problems of the USSR Academy of Sciences, in Leningrad Oblast each year more than 300,000 tons of quite suitable metal are sent to bases of Vtorchermat.³ And there are cases like this in our republic too. Thus in 1983 the Kharkov Yuzhkabel Plant released to the procurement points of Vtorchermat and Vtortsvetmet 8 tons of shredded copper and 1.5 tons of wire which are in short supply. In the same way the Crimean dairy got rid of 40 kilograms of foil and the Kharkov GPZ-8 turned over 54,000 tons of bearing steel as scrap metal.⁴

Apparently it would be expedient to change the existing policy for planning procurements of scrap metal and wastes. In particular, the plans should be established only for procurement organizations of Vtorchermat and Vtortsvetmet, which should be transformed from registration and control agencies into active procurement agencies for wastes. The enterprises and associations, in our opinions, on the basis of their capabilities, should determine for themselves the volume of release of scrap metal and wastes and announce this to the procurement organizations. Vtorchermat and Vtortsvetmet should conclude agreements with them. Such a policy for planning, on the one hand, will increase responsibility of the organizations of Vtorchermat and Vtortsvetmet for fulfillment of the plans and force them to seek out and utilize reserves, including reserves of household metal scraps, which, unfortunately, are still being shipped to the dumps. On the other hand, this will make it possible for the enterprises and associations to discover and turn over all of the scrap metals which they do not need, since they will not be morally or materially punished for reducing the volume of release of these metals in the subsequent period. For many enterprises hold on to scrap metal in order to fulfill the plan in subsequent years.

There are essential shortcomings in the accounting and statistical reporting of the expenditure and savings on resources. In particular, reports concerning the fulfillment of assignments regarding the average reduction of norms for the expenditure of raw and processed materials (Form No 12-SN) are kept by statistical agencies in only 11 machine-building ministries (the Ministry of the Machine Tool and Tool Building Industry, the Ministry of Construction, Road and Municipal Machine Building, the Ministry of the Automotive Industry, the Ministry of Heavy Machine Building, the Ministry of Machine Building for Light and the Food Industry, the Ministry of Chemical Machine Building, the Ministry of Instrument Making, Automation Equipment and Control Systems, the Ministry of Power Machine Building, the Ministry of the Electrical Equipment Industry, the Ministry of Agricultural Machine Building and the Ministry of Machine Building for Animal Husbandry and Fodder Production) and these are not for all materials. The expenditure in material resources in light industry, the food industry, the chemical industry and other branches of industry are not taken into account by the Central Statistical Administration. Reports on the utilization of secondary raw material are kept only for three kinds of wastes (scrap paper, saw mill and wood-processing wastes, and ash and slags from thermal electric power stations), and this is clearly not enough. There are no reports on the material-intensiveness of products.

In our opinion, the Central Statistical Administration must develop methods for calculating the material-intensiveness and also forms for accounting and

reporting it. One should also include a broader range of materials in the reports.

Material and Moral Incentives for Those Competing for Economy and Thriftiness

Unfortunately, the systems of incentives in effect at many enterprises do not sufficiently motivate the collectives of the enterprises or individual workers to develop socialist competition for economy and thriftiness.

In the first place, the payment of bonuses to workers for economizing on the material resources from the wage fund frequently leads to a violation of the ratios between the rates of growth of the average wages and labor productivity. And this causes the managers of enterprises and associations to reduce the amounts of the bonuses.

The source of bonuses for engineering and technical personnel for economizing on material resources is the material incentive fund, the money from which is used in many areas (current bonuses for quantitative and qualitative indicators of work, bonuses for carrying out especially important assignments, bonuses for winners of the socialist competition, bonuses for the results of the year and so forth). Therefore not enough money is left in this fund for incentives for economy and the bonuses are paid in small amounts. Even at the Moscow Electric Light Plant Association, where socialist competition for economizing on material resources has been developing for a long time, the bonuses for this are envisioned in the amount of 10 percent of the wage rate (salary) per month. And their actual amount is frequently 20-30 percent less because of the shortage of money in the material incentive fund and amounts to 5-8 rubles.

In the Kievtorgmash Association no more than 25 percent of the savings from reducing the norms for the expenditure of ferrous metals and 15 percent of the savings on other metals are to be used for bonuses for the workers even though in the decree of the CPSU Central Committee and the USSR Council of Ministers, "On Stepping Up the Work for Economy and Efficient Utilization of Raw Materials, Fuel and Energy and Other Material Resources" (1981), the payment of the bonuses is established in an amount of up to 75 percent of the value of the materials that are saved.

There is no unified methodological approach to establishing indicators for bonuses, the amounts of the amounts or the sources and policy for awarding bonuses for economizing on material resources since there are no standard provisions.

In the second place, the shops and sections of the enterprises are still unsatisfactorily provided with control and measurement instruments for accounting for the expenditure of electric energy, water, steam and fuel. As a result, the savings achieved in the enterprise as a whole in terms of these kinds of resources are distributed among the shops and sections according to calculations. And yet these data concerning savings also serve as a basis for paying bonuses. In the majority of enterprises that were investigated they had not arranged individual and brigade accounting for economy of material resources.

In the third place, in the provisions concerning bonuses, as a rule, there are no indicators or conditions for awarding bonuses to workers who have a thrifty attitude toward equipment, machines and instruments or for their operation in excess of the established norms.

In the fourth place, moral incentives are not sufficiently used to encourage workers to be economical and thrifty, and in particular they are rarely awarded diplomas and the names of the leading workers in the competition for economy and thriftiness are rarely posted on the honor roll or in the honor roll book, and special titles, for example, "the most thrifty," or "a collective of high economy" are conferred even less frequently.

The provisions concerning incentives for economizing on metal of 31 December 1981, which were approved by the USSR Gosplan, the USSR Ministry of Finance, the USSR State Committee for Labor and Social Problems and the AUCCTU, envision direct deductions into the incentive funds of part of the savings obtained when reducing material expenditures as compared to the limit. These deductions are made from above-plan profit and are distributed between the material incentive fund and the funds for social and cultural measures and housing construction in proportion to their amounts established in the five-year plan for the corresponding year.

Direct deductions will contribute to a certain degree to improving the system of incentives for economizing on material expenditures, but they cannot fully motivate the collectives and individual workers to economize since they are distributed between the two funds for economic incentive, and within the material incentive fund they are distributed among all the articles of expenditure. The collectives of the enterprises and associations, as before, will experience a shortage of funds for bonuses for economizing.

When there is no organic interconnection between the results and the bonuses for economizing on resources there appears a formal attitude toward the competition. Therefore we think that it is necessary to have a stable source of funds for incentives to economize. It should be a special bonus fund which is formed in the amount of up to 50-70 percent of the value of the resources that are saved. The effectiveness of the competition for economizing will be greater.

Economizing on material resources is achieved mainly as a result of technical factors--the creation of new implements of labor, systems of machines, highly economical reduced-waste and waste-free technologies, and so forth. But at the same time organizational-economic measures and socialist competition also play a significant role in their thrifty and efficient utilization. It is necessary and possible to increase their influence on reducing expenditures of resources. This is shown by the experience of Odeskislrod mash and other leading enterprises.

FOOTNOTES

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TECHNICAL PROGRESS AFFECTS WORKERS

Novosibirsk EKONOMIKA I ORGANIZATSIYA PROMYSHLENNOGO PROIZVODSTVA (EKO) in Russian No 7, Jul 85 pp 70-81

[Article by V. V. Kazarezov, first secretary of the Novosibirsk CPSU Gorkom: "The Machine Tool and the Machine Tool Operator"]

[Text] We can see the scientific and technical revolution in the fantastic changes that have been brought about in technical equipment and technology by the creation of supermachines, reactors, superpowerful and multipurpose installations, the latest means of communication and transportation, and so forth. But this is, as it were, only the "apparent" part of the complex process of scientific and technical reequipping of public production. No less significant are the economic, social and organizational-technical changes, whose significance is frequently underestimated.

This is especially noticeable in machine building, which determines in a decisive way the intensiveness of the process of change and division of labor. As production improves traditional occupations and specialties die out and new ones appear, labor processes are broken down because of the more complicated technology into individual, separate operations. The greater the specialization, the greater the opportunities to master occupations and this means also to increase labor productivity. But a question arises here: What about the content of the labor? With deeper specialization it clearly decreases, the work is made less attractive, and it does not meet the intellectual demands of the modern worker.

Researchers and practical workers see various ways out of this situation. They think that it would be correct to "switch" the worker to perform various functions during the course of a shift. Others reject this path, thinking that only prolonged activity in a particular area will provide for complete covering of the occupational capabilities of the individual. Still others see the path to the solution of the problem in mastering associated occupations and they assert that even when there is no automated equipment this process is expanding from day to day. One of the researchers even gives as proof the Novosibirsk Siblitmash Plant, where they have set the task of training 300 people in second occupations during the 5-year period. But as one can clearly see today, life has rejected this approach: of the aforementioned 300 workers

only 40 are working in combined occupations. These measures have not turned out to be necessary either for production or for the workers themselves.

One also encounters this opinion: the increasingly more complicated machine tool equipment of machine-building plants requires not a simple worker, but a specialist who has certain knowledge, an adjuster who is gradually crowding the machine tool operator out of the occupational structure. During the 1970's they even tried to prove that this will take place in the next 1.5 to 2 decades. In fact this is far from the case. In the first place, manual labor is slow at letting go of its positions and, in the second place, the machine, as before, is "holding" man tightly by its side. This is taking place because in certain cases we have still not found methods for automating processes and in other cases they are simply inexpedient. Moreover, in machine building, a branch which "directs" many productions, the proportion of comprehensively mechanized and automated enterprises is still relatively small.

What has been said gives us reason to assume that it is impossible to accelerate objective processes, to speed up events, and it is unreasonable to cherish high hopes. Today the adjuster accounts for an extremely modest proportion of specialists in machine building--only 2.5 percent, which is less than one-fifth of the proportion of machine tool operators in metal, one-eighth the number of fitters, and two-thirds the number of loaders, subsidiary workers, and so forth. Additionally, the rates of increase in the workers in this occupation are not accelerating significantly. Thus while during 1959-1975 their proportion increased by 0.6 points (from 1.6 to 2.2 percent), that is, 0.037 points a year, during 1976-1982 this increase amounted to 0.045 points a year (from 2.2 to 2.5 percent). The adjuster is an occupation in mass and large-series production, where the utilization of automated equipment is the most advantageous. But in machine building it accounts for no more than 20 percent. And more than 50 percent of the products in machine building are composed of nonstandard equipment.

Because of this it seems that the occupational structure of the machine-building branches should be arranged for the long-term future taking into account the tendencies toward changes in the fleet of metal-processing equipment and the replacement of old equipment with new machine tools. The process of replacement is not as rapid as we should like it to be. In the arsenal of metal-processing equipment of today's enterprises up to 80 percent of the equipment is composed of metal-cutting machine tools and, consequently, lathe operators, milling machine operators, plane operators, polishing machine operators, drilling machine operators and other metal-processing specialists will for a long time constitute the main detachment of the working class in machine building. Successful fulfillment of the plans and achievement of the earmarked goals will depend on strengthening and augmenting it with skilled, disciplined personnel, on the people who come to replace the older generation and on the way the best traditions originated in the branch develop and multiply. This is a subject of great concern of party agencies, managers of enterprises, engineering and technical and economic services, public organizations and also the system of public and occupational-technical education.

The attention given to this problem today should be at least as great if not greater than the attention given to providing machine building with the latest technical equipment. I dare say that the orientation, unjustified in many cases, toward accelerated rates of automation of the most important metal-processing processes and presenting what is desired for what is real have led to serious omissions in the creation and retention of machine tool operator personnel. Today these mistakes must be corrected as rapidly and energetically as the rates of progress increase in technical equipment and technology.

Suffice it to say that even in the 1950's the problems of machine tool workers in machine building simply did not exist. But then the shortage appeared and began to grow. During the 1970's and 1980's it became a factor impeding intensive development of the branch. The coefficient of the utilization of the equipment is decreasing and the number of metal-cutting machine tools which stand idle because of a lack of workers is increasing.

The general tendency has also affected machine building in Novosibirsk. We have attentively studied the situation at a number of enterprises whose technical-economic and social potential reflects the condition of the machine-building branch as represented in the city. Let us say directly and frankly that the picture does not inspire confidence and it requires the most resolute intervention. With an increase during 1972-1982 of the number of machine tools by 19.5 percent the number of machine tool workers decreased during these same years by 6.9 percent. The shortage is constantly becoming worse and now exceeds 15 percent of the overall number of them.

Understandably, such a shortage leads to interruptions in the work of assembly shops, which are not satisfactorily supplied with parts from the mechanical sections, and to rush work whereby certain enterprises are forced to turn over 60-70 percent of the monthly output during the last 10 days of the month. As a rule, the "rush" period accounts for most of the painting, galvanizing, regulating and testing work as well as control operations. They include an immense number of so-called "superfluous people" in assembly work, loading and unloading work, in the warehouses and in the sales divisions, whose task is to provide for fulfillment of the plan by any means. Then they again fall into a "slump" until the next rush period. Quality suffers a great deal because of this system of releasing products. During recent years it has almost become the norm that a combine, motor vehicle, machine tool or car received from the conveyor requires serious work locally.

The managers not only of individual enterprises, but also of branches can object: we are speaking about a long-known problem which is not so much their fault as their burden. In some way they are right. But the existing situation should force each one of us to be even more attentive and careful with machine tool operators, with retaining them and, which is especially important, with utilizing them efficiently. It would seem that there are still significant reserves here, but the difficulty lies in putting them to work.

By utilizing statistical data it is easy to note that the number of newly trained workers is increasing while the growth of the number of workers is

simultaneously decreasing. Another definition of this process is a sharp reduction in the occupational stability of personnel in industry. Here it would be correct to devote special attention to the training of personnel in the system for vocational and technical education. Certain specialists think that this is the main source of formation of labor resources. Predictions have even made: even under the current five-year plan the vocational and technical schools will satisfy the needs of the enterprises for workers by 50 percent. I believe that there is not yet sufficient justification for such expectations: today the schools train no more than 22 percent of the workers, and in Western Siberia even less. And this is not even the essence of the problem. During the last 15-20 years we have seen clearly a problem whose solution lies at the intersection of many roads--the arrangement of education and training in the system of vocational and technical education, organization of work with youth personnel at the enterprises themselves, study of the tendencies toward technical reequipment of production, and so forth. We are speaking about retaining the graduates of vocational and technical schools, about their occupational stability, which today are clearly unsatisfactory.

At the beginning of the 1970s we conducted an investigation in which we tried to clarify the production destiny of graduates during 1962-1971 from two Novosibirsk schools--GPTU No 1, which trains personnel for our oldest association, Sibselmash, and No 21, where the base enterprise is the plant for precision machine building. For control we used two groups of lathes and milling machine operators from the annual graduation and traced their fate over the next 10 years. It turned out that of the 200 lathe operators trained during these years for Sibselmash, only 32 remained in the association, and only 10 of these had not changed their occupation. Of the 187 milling machine operators only 42 were included among the ranks of personnel at the enterprise, but 14 of them were not working in their specialty. We found approximately the same thing at the plant for precision machine building. On the whole only 14 percent of the young workers remained at the enterprises where they were sent after completing training in the two schools that were investigated, and only 9 percent retained the specialty they had acquired.

We were also interested in the question of what is being replaced with what? An analysis showed that young machine tool operators preferred "easier" specialties to their own occupations--laboratory workers, galvanizers, crane operators, monitors, batchers and so forth.

It is not difficult to assume that such a picture could not leave the school managers, nor the administration nor the public organizations of the enterprise in an indifferent condition. Understandably, they took measures. But were they able to rectify the situation?

Judging from the results of an investigation which covered the next 10 years (1972-1981) no positive dynamics were observed. On the contrary, things became even worse: after the first year of work at the enterprises only 41.7 percent of the vocational and technical school graduates remained, after the second year--19 percent, and after 5 years--only 11 percent. Attention is also drawn to the fact that the instability of the young machine tool operators is increasing against a background of an overall reduction of labor turnover in Novosibirsk Oblast.

A whole number of factors lie at the basis of this phenomenon.

The intensiveness of the labor of the machine tool operator is increasing because of the increased speeds of cutting of metals (during the past decades the cutting speeds have increased severalfold), and more rigid requirements are placed on the quality of the parts that are processed both in terms of purity and in terms of precision. Labor is becoming more complicated along with the increased number of parts of machines made out of materials that are difficult to process--nonrusting, heat-resistant, anticorrosive and other high-alloy steels and alloys. This, if one may put it this way, is the group of technical factors. No less significant are other factors. The rise of the general educational level of youth acts in contradiction to the limited capabilities of realizing this level since the work under the conditions of flow-line production, as a rule, does not require advanced knowledge. On the other hand, the "competition" among occupations is increasing, that is, there is a larger number of occupations and workers in them involved with electrical equipment, radio electronics, and computer equipment, which are very popular among youth.

It is easy to norm the labor of the machine tool operator because the fulfillment of the norms and the provision of relatively high earnings require hard work throughout the course of the shift. But norming the labor of the assembly worker, the adjuster, the tester and workers in other similar categories is being done on an experimental statistical basis, and takes into account--we must honestly admit--not so much the volume and content of the work, as the existing level of wages. As a result, with approximately equal pay, the expenditures of physical and nervous energy are considerably greater for the machine tool operator than they are for workers in many other occupations.

The shortage of machine tool operators not only holds up the development of machine building, but also indirectly affects other branches. It is for this reason that industry is slow in realizing many scientific and technical developments. Scientific institutions do not have experimental bases whose personnel base is composed of these same metal machine tool operators.

It seems that the approach to solving this important state problem should be comprehensive and include the solutions to problems of a technical, organizational and social nature. It is necessary to streamline the structure of metal-processing equipment: reduce the proportion of metal-cutting machine tools and increase the proportion of forged-press and smelting equipment. In the structure of the metal-cutting equipment it is necessary to increase the proportion of machine tools with numerical program control, processing centers and robotized complexes, and also create prerequisites for introducing flexible automated production. Only this way will it be possible to release machine tool operators or compensate for the shortage of them.

A considerable amount of work is being done in this area in Novosibirsk, and it is being coordinated by the Council for Scientific and Technical Progress under the CPSU Obkom. There is a section here for flexible automated productions whose task is to form the oblast program for creating GAP's which

is intended for the long-range period and to unite the efforts of industrial enterprises and scientific organizations in realizing it. In June 1984 they conducted the oblast scientific practical conference titled "Experience, Prospects for Creation and Application of Automated Productions at Enterprises of the Oblast," where they summed up the results and developed recommendations. As a result of the dissemination of powder metallurgy alone, it is intended to release 1,200 workers in the oblast, mainly machine tool operators, and to save 7,000 tons of metal.

No small contribution to the creation of technologies involving fewer people is being made by Novosibirsk machine builders who are producing metal-processing equipment (metal-cutting machine tools and smelting machines) which are equipped with systems for numerical programmed control and robotized devices. Thus we exert an influence on solving the personnel problem for machine operators on the scale of the country since only an insignificant proportion of this equipment is used in the oblast.

The second path to solving the problem of machine tool operators is thrifty, efficient utilization of existing personnel, increased occupational stability and improvement of the system of training. To a considerable degree we associate our hope for success in this matter with further development of collective forms of organization and stimulation of labor. In addition to the obvious economic effect which has manifested in increased productivity, the collective contract also produces a significant social effect.

A young worker who is a recent graduate of a vocational and technical school and ends up surrounded by senior comrades who are joined together by common interests, even with a minimum coefficient of labor participation, is guaranteed a stable wage, and he confidently acquires occupational mastery. And what is no less important in comprehensive brigades that join together workers of various professions is that real conditions are created for manifesting the law of changing labor.

The experience in the development of collective forms of organization and stimulation of labor which was accumulated at Novosibirsk enterprises lay at the basis of the socioeconomic experiment conducted on the initiative of the oblast CPSU committee and the decree of the USSR State Committee for Labor and Social Problems and the Secretariat of the AUCCTU. The essence of this is that the collective contract is extended to structural subdivisions of a higher level than the brigade--the shift, section, shop and, in the future, possibly, also the enterprise. Along with the basic workers, the collective includes auxiliary workers and engineering and technical personnel, including line managers.

And, of course, one cannot think about solving the problem of providing personnel without improving their training. It is especially necessary to touch upon their occupational orientation. And a certain amount of experience has been accumulated here in Novosibirsk Oblast. The object of occupational orientation work is mainly schoolchildren in the senior grades. The work is done through interschool production combines and also directly in the schools with the help of supervisory industrial enterprises. The schoolchildren are given an idea about the leading occupations and their significance, excursions

are conducted to the plants, and theoretical training is combined with work on the machine tools. We consider as a positive result of occupational orientation work the fact that many schoolchildren with whom it has been conducted has subsequently gone to work or to training institutions in the profile of this education.

But the low level of occupational stability confirms that the occupational orientation frequently amounts merely to agitation for the occupation and is not reinforced by occupational selection. For a certain amount of time there is the illusion of well-being, which is then dispelled. Young people who are "agitated" into being machine tool operators frequently leave the occupation as soon as they acquire a complete idea about it from their own life experience.

An enterprise which has recognized the need both for occupational orientation and for occupational selection has considerable success in creating stable collectives and reducing labor turnover. An example of a comprehensive approach to solving the problem of machine tool operator personnel is provided by the Novosibirsk Instrument-Building Plant imeni V. I. Lenin. A large amount of work is being done here to switch parts which were previously manufactured from rolled metal on metal-cutting machine tools over to smelting under pressure. The blanks that are obtained are as close as possible in form to the prepared item and require an insignificant amount of mechanical processing. The plant is intensively introducing highly productive equipment -- machine tools with numerical program control, processing centers and automated and semi-automated equipment. On the basis of these machine tools, automated transportation systems and computer equipment, a section has been created for mechanical processing of complicated body parts--the prototype of future automated productions. As a result, a considerable number of machine tool operators are being released.

A good deal is also being done to retain the existing machine tool operators who are working on universal metal-cutting machine tools. The plant has a council for occupational orientation and a sociopsychological laboratory which handles problems of occupational orientation, occupational selection and adaptation of young workers.

The result of the active work of party and trade union organizations as well as executives in this area is a persistent tendency toward reduction of labor turnover. And the results of the enterprise's economic activity are directly dependent on the stabilization of the collective.

Effective work for occupational orientation, occupational selection and adaptation of young workers is also being done at the Aviation Plant imeni Chkalov (labor turnover here is 8-10 percent), the Elektrosignal Plant and other enterprises. The existence of such positive experience and activation of the work for disseminating it make it possible to count on improvement in the personnel situation.

If one is to speak about measures which should, in our opinion, be taken on a statewide scale in order, on the one hand, to reduce the need for machine tool

operators and, on the other, to utilize existing personnel more efficiently, they can be reduced to the following:

proceeding more decisively toward increasing the proportion of forge-press and casting machines in the structure of the metal-processing equipment that is produced, correspondingly reducing the proportion of metal-cutting machine tools. Although this is not a new way of stating the problem, the structural changes are taking place extremely slowly as before;

in the structure of metal-cutting machine tools, to increase the production of robotized complexes, coordinating machine tools, robots and the control system into one and thus creating prerequisites for the formation of flexible automated systems. The need to discuss this again today is explained by the fact that the absolute majority of robots produced today which are to free man from the direct process of production are manufactured individually and arrive at the plant "naked" without links that connect the robots to the machine tools. Coordinating the machine tool and the robot requires considerable expenditures of labor, money and time, which reduces and sometimes even nullifies the expected effect, which can be realized only at some time in the distant future;

to take practical steps to create in the regions interbranch specialized enterprises for producing instruments and metalwares, repairing machines and equipment, and other work. Labor productivity increases many times over in specialized production and hundreds of thousands of workers can be released, including machine tool operators. But today at specialized enterprises of the country only 10 percent of the equipment is repaired, and instruments, including standard ones, are manufactured at practically every machine building plant;

also worthy of consideration is the question of singling out an occupational group of machine tool operators by paying them more than workers in other machine-building specialties. The establishment of wage rates that were 15 percent higher did not lead to a corresponding increase in earnings or an incentive for workers in other occupations to change over to work as machine tool operators;

occupational orientation work should be carried out more aggressively as should the establishment of the prestige and social significance of machine tool operators, including through artistic literature, the theater, movies, radio and television.

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RESEARCH RESULTS REALIZED IN PRACTICE

Novosibirsk EKONOMIKA I ORGANIZATSIYA PROMYSHLENNOGO PROIZVODSTVA (EKO) in Russian No 7, Jul 85 pp 82-90

[Article by Sh. O. Abdulayev, candidate of technical sciences (Moscow) and A. V. Yevseyenko, candidate of economic sciences, Institute of Economics and Organization of Industrial Production of the Siberian Branch of the USSR Academy of Sciences (Novosibirsk): "The Introduction of Special-Purpose Fundamental and Applied Research"]

[Text] It is known that realizing the results received by science is no less important than the development of science itself. People are even speaking about a new theory--the theory of introduction of innovations.¹ For 5-10 times more time can be spent on the creation of production capacities and the assimilation of the output of new products than is spent on research and development.

There are various ways of utilizing the results of fundamental research. Among the most widespread is the system of "academic institute--branch institute--design bureau--plant" and it reflects the traditional structure of introduction (see Fig. 1). If one is to include also the intermediate stages, for the Institutes of the Siberian Branch of the USSR Academy of Sciences, the system is this: "institute--Presidium of the Siberian Branch of the USSR Academy of Sciences--Presidium of the USSR Academy of Sciences--ministries--branch institute--design bureau--plant." Each transfer of the documentation is accompanied by a many-months procedure of coordination with the higher organization.

A bottleneck in the system is the need to pass consecutively through all stages of introduction: this precludes the possibility of reducing the time periods. Moreover, the suggestions of academic institutes are sometimes subjected to critical reworking and changes in the branch scientific research institutes. And frequently for the worse. The desire to have "one's word" prolongs the preparatory period. And as a result of all this industry does not assimilate the scientific result until 6-12 years (and more) after it is received. As concerns scientific achievements which are on the level of discoveries, their introduction takes approximately 20 years. Certain results in optics and electronics are exceptions.

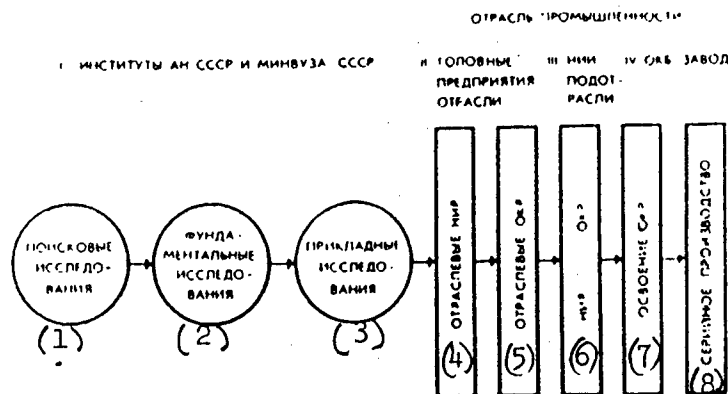


Рис. 1.

Figure 1

Key:

1. Investigatory research
2. Fundamental research
3. Applied research
4. Branch scientific research work
5. Branch experimental design work
6. Scientific research and experimental design work
7. Assimilation of experimental design work
8. Series production

One of the effective means that helped to rapidly apply the results of fundamental research (FI) is extensive dissemination in industry of information concerning new discoveries in various areas of science and the possibilities of their practical utilization. Several paths exist for this including:

the organization of a special information service which provides scientific information to the institutes and laboratories in industry;

the enlistment of scientists engaged in FI to participate in solving applied problems (for example, as consultants or experts);

the formation of temporary interbranch groups of engineers and scientists for work in the technical sphere.

In recent years there has been an intensive search for organizational forms that make it possible to essentially reduce the time periods for the introduction of the results of fundamental research. One of these forms is special-purpose FI. This is usually defined as a search for new information or a new understanding of phenomena whose results can be useful for

implementing strategic plans for the development of the branch, although the degree of this usefulness cannot be determined beforehand.

In order to provide for maximum effectiveness of special-purpose FI, scientific research organizations should have a clear idea of the technology and economy of production and even participate in its long-range planning. This makes it possible to determine the future zones of search for knowledge which are necessary for the development of new products and progressive technological processes. One need only recall that the selection of future directions for special-purpose FI is not a combined evaluation of the needs of production, but the result of detailed analysis of concrete situations with an orientation toward groups of enterprises as possible consumers of these developments.

In order to select directions for special-purpose FI it is recommended:

to conduct an analysis of long-range plans for the development of production and reveal areas that require new products or other technological processes;

to consider the possible area of research and reveal in it a promising direction which corresponds to the greatest degree to the overall nature of the object;

to maximally concentrate resources and efforts on achieving practical utilization of individual fundamental results obtained in the process of research, that is, not to wait until completion of all research, but simultaneously to work out technological and experimental design developments.

According to estimates, such a sequence of work reduces the scientific and technical cycle by 3-5 years.

The Siberian Branch of the USSR Academy of Sciences has made attempts to conduct special-purpose FI within the framework of laboratories that are oriented toward problems in the branch. By the beginning of 1983 at institutes of the Siberian Branch of the Academy of Sciences they had created nine branch scientific research laboratories with an overall total of more than 60 individuals employed in them. They are carrying out 26 scientific research projects.

Laboratories have been created using funds from individual enterprises of industrial ministries. Their tasks also include searching for areas of FI for solving quite specific production problems. A temporary scientific and technical laboratory is being created for a period of no more than 3 years in order to develop a concrete means or system, utilizing the fundamental results of academic institutes. It is formed from the staff workers of the institute who are solving the problem that has been set along with their basic planning work. Here the academic institute concludes an economic agreement with the

branch enterprise which provides work for the temporary laboratory. This form of cooperation makes it possible to essentially reduce the time for development and introduction of concrete methods and items, and therefore it is extremely effective for industry.

An important merit of this kind of cooperation is the feedback from the branch enterprises and organizations to the academic institutions. The latter receive information concerning technical and economic indicators that have been achieved because of the introduction of the scientific research work they have done as well as about branch problems whose solution requires their participation. This kind of feedback stimulates the orientation of academic institutes towards fundamental branch problems. This circumstance is a decisive one when conducting special-purpose FI. A peculiarity of the organizational form developed in the Siberian branch of the USSR Academy of Sciences is a new stage in research which includes elements of both fundamental and applied work. As a rule, such research is conducted in those areas where it is practically impossible to divide the scientific research cycle into strict stages.

Unfortunately, the enterprises try to obtain a return from the activity of the temporary laboratories as quickly as possible, so that they orient them toward applied work of a narrow profile. The desire for an immediate effect can reduce the total effectiveness of the activity of these laboratories, since their main task should be the organization of breakthroughs in scientific areas which are of interest to industry.

Let us take a look at how the system "academic institute--plant (or academic institute--design bureau--plant)" operates using the example of cooperation between institutes of the Siberian branch and ministries.

In the proposed structure (2) there are three levels:

- 1--branch (head enterprise)--Siberian Branch of the USSR Academy of Sciences;
- 2--branch scientific production association (subbranch scientific research institutes)--academic institute;
- 3--plant (branch design bureau, association)--academic institute (design bureau).

At the first level the branch problem is formed and a long-term program for cooperation is developed, which envisions the participation of the head enterprises in its implementation. Thus conditions were investigated for the dissemination of radio waves for developing radio communication in various ranges. This task is divided into its constituent parts: diagnosis of the condition of the means and prediction of the conditions for the dissemination of radio waves. Participating in the implementation of this task as clients and coperformers are the head enterprises of the branch and institutes of the Siberian Branch of the USSR Academy of Sciences which has a radio physics profile. Their joint work makes it possible to apply packages of applied programs for diagnosis of the condition of the means and prediction of the conditions for the dissemination of radio waves which were previously not

used. Moreover the time period for the introduction is determined by the time of the performance of the scientific research work; for intermediate stages it is 1-3 years. A reduction of the time period is promoted to a significant degree by the branch scientific research laboratories (ONIL) which at the same time are adapting the results of the research of academic institutes to the concrete requirements of the branch enterprises.

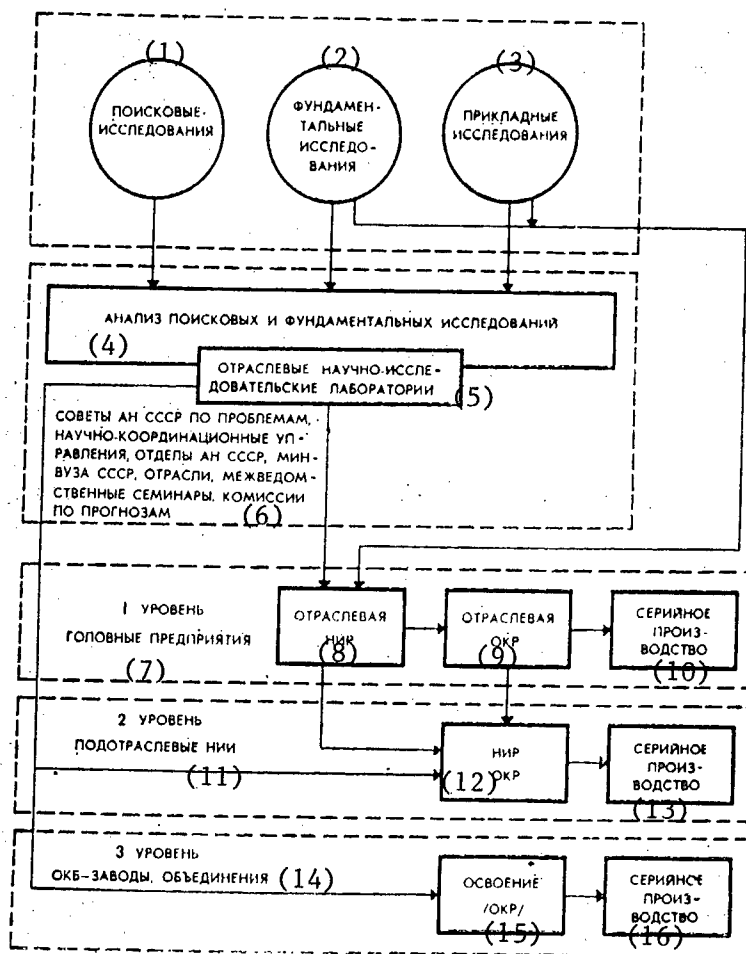


Рис. 2.

Figure 2

Key:

1. Investigatory research
2. Fundamental research
3. Applied research
4. Analysis of investigatory and fundamental research
5. Branch scientific research laboratories

(Key continued on following page.)

6. Problem councils of USSR Academy of Sciences, scientific-coordination administrations, divisions of USSR Academy of Sciences, USSR Minvuz, branches, interdepartmental seminars, commissions for prognoses
7. Level 1--head enterprises
8. Branch scientific research work
9. Branch experimental design work
10. Series production
11. Level 2--subbranch scientific research work
12. Scientific research and experimental design work
13. Series production
14. Level 3--experimental design bureaus, plants of association
15. Assimilation (experimental design work)
16. Series production

At the second level one considers the subbranch problem for which there is a scientific (theoretical) reserve in the academic institutes. The scientific production association, which has the necessary scientific and technical base, participates from the very beginning in the realization of this reserve (in conducting experimental research). The participation of the branch enterprise in the stage of experimental testing of theoretical points makes it possible to change over to performing experimental design work without losing time. One illustration of this kind of cooperation is, for example, the results of research and development of a modern element base of microelectronics for means of communication. This includes, in particular, research on the possibility of transmitting signals through communications channels on the basis of optic electronic devices which was performed in the Institute of Physics of the Siberian Branch of the USSR Academy of Sciences. Here, in conjunction with the branch enterprise, they have developed, manufactured and tested a mockup of fiberoptic communications lines for intrasystem transmission of information.

The third level of cooperation typically has direct ties between the plant, the design bureau and association which are performing specific work and the academic institute. For example, the Irkutsk Institute of Organic Chemistry of the Siberian Branch of the Academy of Sciences, in conjunction with branch communications institutes, has developed and investigated the basic properties of new types of epoxy materials for sealing microassemblies without containers. New polymer compounds make it possible to replace the metal and glass containers for sealing, which leads to a savings on special metals and simplifies the technological process of production.

Thus long-range fundamental research oriented toward specific problems of the branch is conducted at the first level. Its results can be fully utilized within 5-8 years. But the intermediate results can be applied as they are obtained, even in the early stages of fundamental research.

At the second level applied scientific research work is done, whose essence consists in bringing the scientific reserves up to the level that makes it possible to formulate and carry out experimental design work. Scientific research work of the second level, as a rule, is realized in production after

2-5 years.

At the third level of cooperation, as a rule, experimental design work is done on the completed projects of the academic institutes or academic design bureaus, the result of which are laboratory mockups of equipment and systems of communications, instruments and technological equipment. The goal of experimental design work performed by the branch enterprise is the manufacture of experimental models of the items and the development of the technical and technological documentation necessary for series production. This work is carried out within 1-2 years.

Thus one achieves a reduction of the time periods for introduction at the first level of 5-9 years, at the second--4-7 years, and at the third--5-10 years.

A typical feature of all three levels of cooperation is the practical utilization of the results of the research. This is achieved through methods and forms of organization that have been created during the formation of the coordinated plan for joint work. The coordinated plan itself can be regarded as a comprehensive target program which is directed toward the utilization of results of fundamental research of the Institutes of the Siberian Branch of the Academy of Sciences in the production of equipment for means and systems of communications. The ministries provide for implementation of the coordinated plan through special assignment of limits for labor, additional financing and centralized material and technical supply.

The proposed structure for introduction is realized with the help of various forms of organization. As a rule, at the first level one uses additional limits for labor (the number of personnel without subtracting those for the base), at the second level--branch laboratories are enlisted more extensively, and at the third level--there is a prevalence of economic agreements, agreements for transferring scientific and technical results and agreements concerning creative cooperation. At all levels of organization of introduction they use economic agreements between enterprises of the branch and institutes of the Siberian Branch of the Academy of Sciences for the performance of scientific research work.

The new structure for organization of the work of enterprises of the branch for introducing the results of fundamental research and the aforementioned forms of cooperation have made it possible within 2-4 years to assimilate 28 developments in the branch and to obtain from joint scientific research work an annual economic effect of more than 20 million rubles.

At the basis of the system for the introduction of the results of fundamental research into production of communications equipment are prognosticatory and research work which make it possible to form a hierarchical tree of goals. The tree is constructed by specialists whose composition remains the same as they change over from global tasks to more concrete ones. But it is not simple to realize the tree of goals since we have not sufficiently developed scientific fundamentals and methods of coordination and there are no legal or economic levers which can be used to improve coordination activity. In order to improve it it is necessary to have an automated system for gathering and

processing information with a data bank which will make it possible to efficiently control the introduction, including the introduction of scientific research.

Improvement of the organization of the work of enterprises of the branch for introduction requires improvement of the organization and management of scientific research and production and also accounting for such factors as the quantitative evaluations of the results of investigatory and fundamental research for selecting the most promising scientific areas, calculation of the economic effectiveness in the stage of applied scientific research and the development of criteria for evaluating the scientific effectiveness and technical significance of the research.

FOOTNOTE

1. Makarov, V. L., "The Introduction of Nontechnical Innovations," EKO, No 10, 1983.

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EFFICIENT UTILIZATION OF MINERALS URGED

Novosibirsk EKONOMIKA I ORGANIZATSIYA PROMYSHLENNOGO PROIZVODSTVA (EKO) in Russian No 7, Jul 85 pp 91-103

[Article by M. Ye. Pevzner, doctor of technical sciences, State Scientific Research Institute of Mined Chemical Raw Material (Lyubertsy, Moscow Oblast): "Mineral Resources Must Be Utilized Efficiently"]

[Text] A large part of the capital investments go for the development of the extraction branches and, as predictions show, the demand for mineral raw material will be steadily increasing. At the same time the USSR expends more raw material and energy per unit of national income than the amount represented by the best world indicators. When minerals are extracted from the earth a considerable quantity of coal, ore and petroleum is not removed. Resource-saving technological processes are applied far from everywhere. We do a poor job of salvaging industrial wastes. To put these reserves in the service of society is an extremely important task in the modern stage.

How Are the Mineral-Raw Material Base and the Mining Industry Developing?

An analysis of the patterns in the development of the mineral raw material base and the mining industry in the USSR and abroad shows the following tendencies.

The increased scale of extraction and consumption of mineral raw material. During the past 30 years in the world the average annual rates of increase of the utilization of primary sources of energy (petroleum, gas, coal and so forth) amounted to 4.9 percent, metal-containing raw material--3.4 percent and non-ore materials--5.3 percent. With the modern level of extraction, about 100 billion tons of rock are extracted from the earth each year. It is assumed that by the year 2000 the demand for mineral raw material in the world will have increased threefold as compared to the present level.

Increased capacities of mining production. This means:

increased proportion of extraction in the large basins and deposits. Thus in the USSR the development of extraction in the Donets and Kuznetsk coal basins, the Krivoy Rog iron ore basin and deposits of the Kursk magnetic anomaly, the Kola Peninsula, the BAM zone and the Norilsk region make it possible by

concentrating production to reduce the proportional capital investments in the assimilation of deposits as well as the cost of extraction and expand possibilities of comprehensive utilization of mineral resources;

increasing the production capacity of mining enterprises. In the world there are now about 20 underground mines with an average productivity of more than 5 million tons each. They include several mines in Sweden, Chile and the United States with an annual productivity of 10 million tons. In our country in the Kansk-Achinsk basin we are constructing the Berezovskiy Coal Mine No 1 with a planned capacity of 55 million tons. In the Ekibastuz coal basin there is the Bogatyr mine with an annual productivity of 50 million tons of coal. The capacity of a number of mines for extracting iron ore reaches 30 million tons. Large enterprises provide approximately 60 percent of the volume of extraction of minerals in our country;

the application in mining production of equipment with ever-increasing unit capacities. Thus about 45 percent of the fuel is extracted with powerful rotor excavators in coal mines of our country. The American company WABCO produces a range of large cargo dump trucks, including a model with a capacity of 170 tons which unloads through the bottom. The United States has created walking excavators with a bucket volume of 134 cubic meters. A four-rotor mining combine is used in underground potassium mines.

Exhaustion of the supplies of rich mineral raw material and increased scale of assimilation of resources with poorer content of mineral components. For example, supplies of copper in the United States will be further increased mainly as a result of using poor ores. In the next few years the content of copper in the supplies of ore that are discovered will decrease from 0.8-0.9 percent to 0.5-0.6 percent. In Canada, because of the processing of poorer ores, the average content of copper in the ore dropped from 1.4 percent in 1965 to 0.9 percent in 1975. A similar situation can be seen with respect to other minerals.

The deterioration and complication of mining-geological and economic-geographical conditions for working deposits. At the beginning of the 1930s there was some question as to whether it was possible to master the extraction of ore at the Norilsk-1 deposit which is located at 69 degrees north latitude, with the long polar nights and with the temperature dropping to minus 55 degrees centigrade, but where the position of the ore was fairly accessible. Now in the Norilsk region they are working by the underground method the deep horizons of Talnakh (about 600 meters) with the increased gas content, the inclination to mining shocks and the most difficult hydrogeological conditions, but the climate in Norilsk has not become any milder during this time.

Even 30 years ago the deepest mine in the world was being worked at a depth of approximately 2.5 kilometers. Today the 4-kilometer mark has been reached in underground mining work. Quite recently the sea floor was inaccessible for extracting raw material. But now in the ocean from a depth of 5 kilometers we have extracted more than 1,000 tons of manganese concretions which also contain copper, nickel and cobalt.

The increased cost of geological prospecting work and the increased expenditures on the extraction of minerals and the price of mineral raw materials. As specialists note, while 15 years ago in our country it took 2 rubles' worth of capital investment to extract 1 ruble's worth of raw material (annual calculation) and 7 years ago it took 3 rubles, today this requires 4 rubles' worth of capital investments, and in subsequent years it will require 5 rubles and more. Up to 40 percent of the industrial capital investments go for prospecting and extracting minerals, and almost one-third and about 20 percent of the labor resources are concentrated here.

The deterioration of the conditions for working domestic deposits of minerals and the increased cost of individual kinds of fuel and mineral raw material were taken into account when the wholesale prices for products of the extraction branches were revived. The long-term tendencies toward increased prices for mineral and energy raw material are manifested even more clearly on the world market. Under these conditions the importance of developing scientific fundamentals and practical methods of solving the problem of efficient utilization of mineral resources and preserving the wealth of the earth cannot be overestimated.

Two concepts can be applied effectively here:

the intensive path of utilization of mineral resources (the concept of intensification);

the unity of problems related to efficient utilization and protection of the wealth of the earth and rational utilization of the resources of the biosphere and environmental protection (the mining ecology concept).

The practice of recent years shows that the gross increase in the extraction of mineral raw material, which seems to be the simplest and most accessible method of providing the national economy with means of production, in reality leads to a worsening of the shortage.

The difficulties of turning to the intensive path of utilization of mineral resources consists in that the current needs frequently limit long-range undertakings. Progressive new organizational and technical decisions which require, as a rule, significant capital investments can produce a return only after a couple of years, but the raw material, fuel and energy are needed today.

Questions of intensification of the utilization of mineral resources are resolved in various ways in the sphere of production of mineral raw material (that is in the sphere of mining production per se) and in the sphere of consumption.

In the sphere of production of mineral raw material this means comprehensive assimilation of large raw material regions, reduction of losses during extraction and processing of mineral raw material, comprehensive utilization of all the useful components contained in the raw material, salvaging of impurities and production wastes, revision of conditions and enlistment for utilization, on a basis of progressive technological decisions, of supplies of

mineral raw material which were previously not taken into account. The economic effectiveness of all these measures is determined on the basis of the interests of the country's national economy and not the individual mining enterprise or even the branch as a whole.

In the sphere of consumption of mineral raw material intensification involves a reduction of the expenditure of raw material as a result of the application of better technology, the utilization of secondary raw material and wastes, the replacement of mineral raw material with artificial materials, and so forth.

Mining Ecology--A New Scientific Area

The essence of the mining ecology concept consists in considering any mining technical process in its direct or indirect connection with all the elements of the biosphere.

Mining production exerts a significant influence on the environment: on the air and water basins, the landscape, the earth cover, the vegetable and animal kingdoms, and the earth's interior. Moreover, with an expansion of the volumes of extraction of minerals, the effect of this influence can be quite equal to natural processes. The correctness of these words is confirmed by the eminent Russian scientist V. I. Vernadskiy when he says that "mankind taken together becomes a powerful geological force." In the USSR and abroad there are about 1.6×10^{12} cubic meters of mineral rock and wastes from processing minerals in the dumps and tailings. We are artificially forming deposits of mineral rock.

In the problem of protecting the environment from the harmful influence of mining there are many unresolved issues which are conditioned by a number of factors, both objective and subjective:

qualitative differences in the circulation of substances and energy in artificial (economic) systems as compared to natural (ecological) ones;

the inadequate substantiation of ecological limitations in the technology for the extraction and processing of minerals;

contradictions between the requirements for improving technical and economic indicators in mining and the need for protecting the biosphere;

the inadequate development of methods for economic evaluation of natural resources and the damage caused by mining to elements of the biosphere;

the departmental approach to the protection and efficient utilization of natural resources;

the poor ecological training of workers in the mining industry.

In order to develop and successfully implement a long-term statewide program for efficient utilization of mineral resources in combination with protection

of the environment, it is necessary to consider the activity of the mining enterprise from a different standpoint.

We are now establishing a new area in mining science--mining ecology, which is of great theoretical and applied significance. Mining ecology studies the patterns of man's influence on the environment in the sphere of mining production and, above all, the interconnection between physical and chemical processes that lie at the basis of the extraction and processing of minerals and the circulation of substances and energy in the biosphere.

This area is called upon to develop a scientific program and methods for studying the given problem and also to construct a general and particular models of the interaction between man and the environment in the sphere of mining production. It is necessary to formulate principles for economic evaluation of changes in the biosphere under the influence of mining production and the overall natural protective effectiveness of measures for efficient utilization of mineral resources and protection of underground wealth, and also to create scientific fundamentals for technological processes which provide for optimal influence of mining production on the environment.

The problem of efficient utilization of mineral resources is a complex one, and its solution embraces several areas.

Maximum Information About the Deposit

To this end it is necessary to improve the methods of prospecting and calculating the minerals, to extensively study the composition of minerals and rocks that are mixed in with them, and to develop scientifically substantiated methods for predicting engineering-geological and hydrogeological conditions for working the deposits.

Each year several tens of millions of meters of wells are drilled and passages are made through hundreds of kilometers of rock. The volume of expenditures on this work exceeds half of the overall expenditures on geological prospecting. Therefore improvement of geological prospecting methods should be directed primarily toward improving the quality and effectiveness of the utilization of equipment. We extensively apply pyrotation diamond drilling, breaking up of masses of rock with shock impulses, coreless drilling of wells, and also remote control methods of examining the earth's thrust.

When prospecting many deposits the substance composition of the minerals and the rock impurities are not studied well. This is caused basically by two factors. First, the immense volume of samples that must be examined. Recently each year 15 million samples have been analyzed. This scale of work requires new express methods of analysis which are based on the application of physical and nuclear physical processes. Second, the geological organizations evaluate deposits only in terms of the main components and, as a rule, they do not take into account the economic effect from side extraction of other minerals and salvaging of impurities.

For example, for the majority of previously investigated copper deposits in the Urals and Kazakhstan we have not determined the supplies of zinc, nickel

and bismuth located there. At 11 of these we have not taken into account the resources of selenium and tellurium, and at six of them we have not accounted for the sulfur. At a number of other lead-zinc and copper deposits the supplies of side components which are still extremely valuable have either not been determined at all or have been determined in categories which do not give us the right to conduct industrial development of them.

It is very important when studying the substance composition of minerals and impurities to take into account the possibilities of their utilization for biological recultivation of the land that has been damaged by mining work. Thus, for example, the supplies of quartz-green sand at the Yegoryev deposit of phosphorites amounts to more than 300 million cubic meters. Until recently this sand was dumped along with the stripped rock and lost forever. Scientists of the State Scientific Research Institute of Land Resources and the State Scientific Research Institute of Mined Chemical Raw Material established that this sand has valuable agrochemical properties and can be used for recultivating damaged land and for increasing the productivity of less productive land and deserts. New technological systems make it possible to place this sand on the surface of internal dumps.

Improving Methods of Extracting Minerals

The creation of new and the improvement of existing technical equipment and technology for the development of deposits bring about more complete extraction and improved quality of the minerals.

First of all let us note the more rapid development of the extraction of minerals by the open pit method, whereby one provides for a considerably lower level of losses as compared to other methods of extraction. Blockless extraction of minerals and a system of development with a marking out of the place being worked are being introduced extensively in underground work. For extracting minerals from deep horizons which are inaccessible at the present time with open-pit and underground methods and also for extracting poor ores and those which are not usually included on the lists, geotechnological methods¹ are used.

The mining industry has accumulated interesting experience. Thus mining enterprises of the phosphate subbranch have introduced a number of new technical systems which make it possible to increase the coefficient of extraction of ore from the earth's interior and to put to use supplies of ore which were previously written off or subject to being written off with the projected technology for mining work. Let us give an example. One of the peculiarities of the Maardu phosphate deposit is the severe marshiness of certain sections. The accepted technology for mining work has not made it possible to extract supplies of ore on marshy sections. Searching for efficient methods and technological systems for working marshy sections of deposits and their technical and economic evaluation have made it possible to recommend a reliable system of mining work which is safe. Its introduction provided for an additional extraction of more than 700,000 tons of phosphorite ore from the interior of the earth.

Within the Polpinskoya deposit which is being worked they have left local sections with limited supplies whose mining with existing multiscoop equipment is inexpedient because of the inadequate work front and the small time periods when the pits are worked in these sections. Therefore some of the supplies of ore in these local sections were written off.

On the basis of research they recommended an effective technology for working local sections using a nontransportation system of processing stripped rock using the ESh 6/45 excavator and for extracting the ore--the EO-4121 hydraulic excavator in combination with KrAZ-256 dump trucks. This made it possible to work sections of the deposit which have complicated configurations of the phosphorite layer and place about 1 million additional tons of phosphorite ore on the books.

As specialists note, in the extraction industry as a whole, with a total extraction of useful minerals of more than 6.5 billion tons, the amount of the overall losses is 2.5 billion tons, including 500 million tons worth a total of 5-7 billion rubles which could be eliminated with the current level of technical equipment.

Norm setting for quantitative and qualitative losses of minerals during extraction is carried out on the basis of standard methodological instructions which were developed by the Institute of Problems of Comprehensive Assimilation of Minerals of the USSR Academy of Sciences. But the practice of norm setting for losses of minerals has indicated the need to develop methods for determining the optimal level of losses, which takes into account changes in the influence of the aforementioned factors in time.

Effectively Extracting Useful Components

The lack of effective technological solutions leads to a situation in which during the processing of raw material for ferrous metallurgy we lose copper and cobalt (Vysogorskoye deposit), lead, zinc, gold, sulfur and rare elements (Sokolovskoye and Sarbayskoye deposits), and phosphorus, aluminum, vanadium and rare metals (deposits of the Baltic area). In individual cases, in terms of value, only half of the valuable components contained in the raw material are extracted.

Mining production is more and more frequently having to deal with complex ores which are difficult to enrich, and this requires extensive utilization during their processing of combined technological systems which include, in addition to enriching operations, processes of pyro- and hydrometallurgy. Collective concentrates which are poor in ores that are usually accounted for, wastes from enrichment, and oxidized ores can be processed expediently using preliminary roasting and leaching, including bacterial, sorption and extraction technology. In practice these processes are still used on an insignificant scale.

The main mineral component of sulfur ores is lime, which goes into tailings during enrichment, although it could be used in agriculture for liming soils. This produces a great effect, for example, in Belorussia, where the application of lime to acid soils considerably increases productivity. And

the Rozdolskoya Sera PO from the tailings of sulfur ores they produce more than 1 million tons of lime meal for agriculture, mainly from the large fractions of the tailings. Salvaging the small fractions, which comprise the basic volume of the wastes from the enriching factory, is made difficult because of the fact that their moisture content exceeds the permissible level and there are no economical methods of dehydrating them. A principally new technology has been developed for dehydration of tailings, which will make it possible to give agriculture several million additional tons of lime fertilizers.

Controlling the Utilization of Mineral Resources

As Dr of Economic Sciences Yu. V. Yakovets notes, the economic mechanisms for control of complete and comprehensive utilization of mineral fertilizers includes:

intercoordinated special-purpose planning of the development of branches of the mineral raw material complex (economic evaluation of deposits, statistical accounting and analysis of the utilization of mineral resources, prediction of the patterns in the changes of supplies of mineral resources, the development of a balance of the needs for raw materials, and so forth);

special-purpose financing of measures for efficient utilization of mineral resources;

increased influence of prices on their efficient utilization;

increased motivation and responsibility for efficient utilization of mineral raw material.

Special attention should be devoted to the development of the theories and methods of economic evaluation of deposits, further improvement of prices for products of the mining industry, and incentives for the enterprises to provide for complete and high-quality extraction of the minerals.

The creation of scientific fundamentals for economic evaluation of deposits of minerals will make it possible to establish the sequence of geological prospecting work in the regions, to substantiate the optimum level of extraction of minerals from the earth's interior, to determine the optimal parameters for the utilization of the deposit, and so forth.

Many elements of the methods for economic evaluation of the deposit are still questionable. This pertains to the application of all-inclusive expenditures and wholesale prices, accounting for the time factor and so forth. Obviously in an economic evaluation it is necessary to take into account such factors as the level of provision of supplies of raw material and the possibility of acquiring the given kind of mineral when processing other kinds of minerals and production wastes.

A substantiated economic evaluation of deposits will make it possible on the basis of the latest achievements to systematically revise the technical and economic substantiation of the conditions. Thus as a result of bringing into

industrial assimilation ores that are poor in P_2O_5 (reducing the conditions from 6-8 to 2 percent), the mineral raw material base of all of the Khibiny apatite deposits can be increased by 1.5 billion tons (65-75 million tons translated into P_2O_5), and this is equivalent to the supplies of a large deposit.

Also of great importance are the development and introduction of an effective system of material incentives for workers of mining enterprises to increase the extraction of minerals from the earth's interior. In recent years a number of mining enterprises have been permitted as an experiment to apply methods of material incentives for reducing losses. But these methods have not produced the expected results. Therefore there has now arisen a need to develop scientific fundamentals of a system of economic incentives for effective utilization of mineral resources.

Improving the Organization of the Utilization of Minerals

The complex of measures for organizational support for efficient utilization of mineral resources contains a revision of existing standards and an economic substantiation of new consumer standards for mineral raw material (particularly for the ash content in coals), and also the development of effective measures for surmounting departmental barriers which impede efficient utilization of mineral resources.

Interdepartmental separation impedes comprehensive utilization of supplies in deposits of minerals. Almost all deposits of minerals contain a whole number of useful components. Their comprehensive utilization reduces losses, expands the raw material base, improves the technical and economic indicators of extraction, reduces capital investments in geological prospecting work and in the mining industry, and contributes to satisfying the needs of the national economy for raw material with reduced expenditures.

The overall economic effect from comprehensive processing of mineral raw material under the past five-year plan was estimated at several billion rubles. But there are still immense reserves here. According to the calculations of specialists, the mobilization of these reserves, with relatively small labor and capital expenditures, will make it possible to increase the potential of the extraction branches by more than 25 percent.

But the existing system of planning and capital construction certainly does not motivate the mining industries to utilize raw material and production wastes comprehensively, since capital investments are always allotted to the ministries according to the increase and the augmentation of capacities for the main kinds of products. And, naturally, the branch is forced to expend the funds for their direct purpose first, and the work with wastes becomes a secondary matter.

Because of this it seems expedient to finance the increase in the capacities for producing products through capital investments of the corresponding specialized branches. Under these conditions it becomes especially important to have regional planning of the utilization of the production wastes and impurities, and also the creation in each mining enterprise of a cadastre of

wastes which would indicate their chemical and granulometric composition, its main properties, the possible area of utilization and the proposed release price and volume of delivery.

One of the forms for organizing such productions can be interbranch territorial production complexes which are oriented toward comprehensive processing of the natural resources of the region with extensive development of concentration, cooperation and specialization of productions on the basis of reciprocal processing of wastes and intermediate products.

FOOTNOTE

1. See: EKO, No 1, 1983.

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NATURE OF MANAGERIAL TALENT DISCUSSED

Novosibirsk EKONOMIKA I ORGANIZATSIYA PROMYSHLENNOGO PROIZVODSTVA (EKO) in Russian No 7, Jul 85 pp 104-114

[Article by A. A. Avakyan, candidate of economic sciences (Krasnoyarsk): "Not Indisputable Ideas About Talent and Mediocrity"]

[Text] Let us think about the fact that there are many enterprise managers who out of kindness take on the role of innovators. They like everyone have the plan hanging over them, nobody reduces it for them, and they are frequently in charge of industrial giants where the very scale of introduction of innovations makes this process much more difficult than it is at small and medium-sized enterprises. And right here next to them are managers who avoid innovations or take a formal attitude toward their introduction under the pretext that any reorganization would impede their fulfillment of the plan.

Nor can one forget about those managers who do not try to introduce innovation simply because they are unable to undertake them. And there are many of these. Suffice it to read the standards of many enterprises (STP), on whose title page there is a signature of approval certified by a seal. The diffuse, indefinite formulation, the lack of system, the lack of a designation and the lack of feedback--this is far from a complete list of the gaps in these "standards." And yet the STP is the law of the enterprise, the standard, the guideline for action. Weak STP's are an indication of a weak manager, and the connection is obvious here.

We know that there are leaders and followers in any business. Of course, not everyone can be a leader. The question is whether or not the society can put up with the immense difference in the results which are reserved between the activity of enterprises that are led by leaders and those that are led by followers.

It can be considered axiomatic that the success of all management innovations depends fully on who applies them, that is, on the manager of the association or enterprise. Hence there arises the conclusion: to try to solve crucial problems of production management without first having solved the problem of the managers, that is, the top managers--means to take half-measures. Slow dissemination of progressive management methods and forms of labor organization and the need for directive measures even for their formal

introduction show that, unfortunately, there are many enterprise managers who are not prepared for innovations.

Cat and Mouse

In the press under the rubrics "A Case of Mismanagement" and "With a Managerial Eye" one sometimes finds materials about how costly equipment which has been acquired has remained in the warehouse or out in the open, and then has been "dispossessed" and written off since there was neither a place, nor the conditions, nor the raw materials nor the processed materials for it, nor would there be in the near future. At the Chilisaysk phosphorite mine alone the losses from this amounted to 700,000 rubles.¹

There are also many known cases in which enterprises have acquired machine tools with numerical program control valued at 30,000-60,000 rubles, and then removed the automatic equipment and program control from them, and the machine tools were used manually, that is, as if they had cost one-tenth as much as they did.

All you have to do is enter the territory of a plant and a surprising picture will open up before you. You will see the warehouse and valuable goods stored up over many years not only next to the NKMZ buildings, under sheds, but also along many kilometers of railroad branches which crisscross the plant here and there.² The colossal amount of damage caused to the state is obvious. What is the responsibility of the managers? In many cases they have none, some of them are given warnings, some of them have been given reprimands, and in individual cases some have been fired.

Obviously it is necessary to put a stop of the penetration of incompetent people into management posts, but how? The difficulty of this kind of administrative problems consists in that solving them involves the interests of many real people and it is necessary, as they say, to "cut to the bone." In practice this gives rise to compromises.

In order to understand and surmount the aforementioned difficulty let us turn to an allegory in which the task, deliberately simplified and formulated in different terms, has an obvious solution. Let us replace the prestigious posts with food, the procedure for selection--with a locked storehouse, and the incompetent applicants--with mice. We end up with a problem from a fairy tale: how to protect the food in the storehouse from the mice?

There are several variants of a solution: plug up the mouseholes, set mousetraps and, finally, put a cat in the storehouse (as long as it will not eat the food). Practice shows that under these conditions the cat is preferable. No matter how many mouseholes you plug up, as long as the food is in the storehouse the mice will continue to gnaw new ones. Mousetraps work, as a rule, only for newcomers, while most of the mice continue to steal the food. And the cat works tirelessly: usually just the smell of her is enough to get rid of the mice. Why? Because she embodies an immediate and irreversible punishment. The cat cannot be deceived, they cannot hide from her, and they cannot get on her good side. It is precisely the impossibility of saving their hides that has such an irresistible effect.

The author understands the weak points of this analogy. But we are not suggesting relying on fear of punishment alone. And so let us return from the analogy to life and we must still draw the conclusion that as long as the incompetent managers are threatened by nothing more than a reprimand, a nice "horizontal" transfer or, in the extreme case, a temporary demotion down one rung of the service ladder, all attempts to close off to incompetent candidates the channels to management posts will not be very effective. And if actions (repeated!) which reveal the clear incompetence of the manager are followed by inevitable sanctions against him himself and the appropriate conclusions regarding people responsible for his appointment, and if the sanctions are severe enough in order to prevent repeated attempts to occupy a management post (for example, deprivation of the right to hold a position at a certain level or personal material responsibility for damage caused by incompetent actions), this might possibly fend off those people who are aware of their incompetence (we do not doubt that they are aware of it!) and their desire to push themselves into management positions.

The administrative punishment we suggest for the unlucky manager might seem strange if he has not committed a crime that is punishable by law. But his guilt is great, for to take a high post for which one is not suited is immoral in the highest degree.

As concerns discovering incompetence, the number of substantiated critical letters from workers to press agencies and the corresponding authorities indicate clearly that even today the eyes, nose and ears of the "cat" are more than enough. As far as her "claws" are concerned, that is, catching these people and drawing conclusions, the number of incompetent managers proves no less convincingly that these procedures are not being carried out sufficiently. The necessary experience has been accumulated and we have the richest arsenal of means. We also have a sufficiently ramified supervisory staff. In the associations, enterprises and farms there are now 800,000 groups and 496,000 people's control posts to which more than 10 million people have been elected. Tens of millions of citizens participate annually in the measures conducted by them (see "Your Duty and Concern, the People's Controller!"--IZVESTIYA, 8 October 1984). The existing laws and procedures envision removing individuals because of failing to meet the requirements of the jobs they hold. What is the matter?

In an Especially Aggressive Environment

A talented scientist, engineer, economist or lawyer frequently creates a fiasco in the post of an administrator. Consequently, administrative talent by its very nature is specific and the lack of it in a manager clearly indicates his incompetence.

During the war years, when there was a shortage of literally everything, we found enough talented people so that under the most difficult conditions industry provided the front with everything it needed.

We have done a great deal in order to open up the way for talented youth. It is the constitutional right of the Soviet citizen to select an occupation to

his liking and in line with his capabilities, without any limitations, and the state renders the necessary assistance in this. Can we, however, assert that in general not a single talent goes undiscovered, and particularly in the administrative area?

Creating the actual possibility for an individual to prove himself is far from all there is. It is necessary to have goal-directed administrative support for the system of advancement of talents. For talents are in any case a no less valuable part of the country's national wealth than the most costly minerals. But the difference is that some deposits of gold or diamonds have not yet been discovered or are not being worked, but at least they remain unchanged until better times. It is a different thing with talent: when the moment passes it is lost forever. "Talent and virtue are usually nourished with respect and praise. When deprived of this support they wither and die, and the activity and energy of the soul fade away. This is a flame which cannot be rekindled," emphasized Gelvetzkiy.

What is necessary in order to provide efficient administrative support for the system for promoting talented people?

Any administrative staff performs at least two functions: distribution of goods and application of sanctions. Therefore those who wish to obtain unearned goods or avoid deserved sanctions try to wedge their way into the staff or open up loopholes. From this standpoint the administrative staff is similar to a mechanism that is operating in an especially aggressive environment.

The engineering support for the stability of the operation of a mechanism in an aggressive environment includes a complex of measures: the manufacture of all parts and components that are in direct contact with the aggressive environment from materials that are resistant to it, frequent preventive maintenance, periodic minor, medium and capital repair with a strictly regulated volume of work, and replacement of elements that are subject to corrosion with new ones which are selected just as carefully. Similarly, an administrative staff which does not undergo periodic purposive inspections for the suitability of the workers included in it will begin to work less effectively in time. Preventive measures slow up the process of "corrosion" only to a certain degree, and they do not completely eliminate it.

V. I. Lenin wrote: "After we began to clean up the party and said to ourselves: 'Away with the self-seekers who stick to the party like thieves'-- everything became better. We got rid of approximately 100,000, and this is excellent, but it is only a beginning.... We need to investigate the suitability of people, investigate their actual work. The next purge will be of communists who pass themselves off as administrators."³

Now we no longer have any bourgeois elements, saboteurs or pests, but we still have careerists, bureaucrats, and bribe takers who are capable of penetrating into management posts, quickly surrounding themselves with similar people, and crowding out the talented, honest, uncompromising people. Fighting against them remains a crucial task for local party organizations. Today this

struggle is being waged constantly. It should be augmented with work for relieving administrative staffs of mediocre people.

In the work titled "The Results of the Party Week in Moscow and Our Tasks," V. I. Lenin pointed out directly: "It is now our duty to be able to find these talents and put them to work."⁴ His words are even more timely now when the immeasurably greater scope of the national economy has correspondingly increased the significance of tactical and strategic decisions that are made by business managers. If one were to compare the national economy to an immense mechanism, the business managers in it could be compared to the most responsible parts, and the requirements the managers must meet are analogous to the strictest allowances for the parameters of these parts. Replacing talented people with mediocre people is tantamount to using rejected parts which do not meet the allowable tolerances. The results are obvious and they are too significant for anyone to be able to consider the procedure for checking to be an insult. For nobody protests when in the interests of general safety the passengers in an airplane are subjected to a special inspection before landing.

The Leader and His Points of Reference

Imagine a team competition where the members of the team are individual economic units: enterprises, associations, scientific research institutes, design bureaus and so forth. The team's position is determined as the sum of positions of members of each team. Economic levers stimulate or slow down the rate of the competition. There are two main reasons why they can be used incorrectly. The first--the incompetence of the manager and methods of fighting against it--we have tried to consider above. The second--the team's lack of motivation to win and the unwillingness to undergo the strain necessary for this--still has to be discussed.

The lack of interest in the team's victory can ensue both from the small amounts of the prize and the recognition coming to an individual member of a team, and from the possibility of becoming lost with impunity among the mass of participants, staying just ahead of those team members who are known to be followers. Indeed, does the manager of a leading economic unit really receive any advantages over one who has an average team? Not very large bonuses and periodic awards force the leader to be in the center of increased attention. The time of leadership is manifested in great resonance (sometimes accompanied by practical conclusions) when there is the slightest interruption; the leader cannot slow down the pace even for tactical purposes; he is forced to work intensively without the slightest deviations. The only people capable of shouldering this burden are those who have the corresponding subjective qualities of a born leader--administrative talent, confidence in their strength, and high moral and political characteristics.

A mediocre person willingly and deliberately prefers to do without the advantages of leadership since it involves the inevitable burden and at the same time deprives one of many personal advantages which accrue to people who are unknown. The root of this evil lies in imperfect planning. Alas, planning again! The imperfection has a number of concrete constituent parts,

but the extremely important one, in our opinion, remains in the shadows. We have in mind a basis for comparison.

The most important point of reference for comparison is the plan. Everyone agrees that the plan should be realistic. But the question is what do they mean by this. Today a plan is considered realistic when the economic unit can carry it out with mainly the base (corresponding to the time of planning) personnel and fixed capital, under the condition that labor productivity increases at the average branch level of increase and that the necessary amounts of material and financial resources are allotted (in keeping with established norms). If there is to be new construction, reconstruction, modernization and so forth, this is taken into account. But that is all. How realistic is such an approach? Does it take into account all the real capabilities of the enterprise? No. Why? We know of many examples in which talent for the job of manager has literally transformed an enterprise in a short period of time. So how realistic is the "average" plan which is calculated by extrapolating the "achievements" of the mediocre managers?

I suggest that the only plan that should be considered realistic is one which the economic unit can fulfill with a talented manager. Missed opportunities never return. One should be asked and one should answer not only for that which has been done, but also for that which could have been done better, but was not (he did not guess, he was afraid, he did not wish to). This, however, is not being done. The objections are simple: Who will determine missed opportunities and how? Who should be considered a talented person and who should be considered a mediocre one? And, finally, where does one acquire the talented people?...

We know of leading firms in the world for practically every specific kind of industrial product. We know their sales markets, their sales volumes, the cost of their products, the conditions for their service. We know or can easily find out their numbers of personnel, structures, sizes, equipment, capital and other data which are necessary for comparison. So what is keeping us from finding out the corresponding industrial hierarchy which makes it possible to determine the specific rivals and competitors for each of our associations and enterprises among the leading firms in the world?

Step by step our economy is making its way to solving this problem. A task has been set to make sure that all products that are newly developed and assimilated by production can compete on the market. Charts of the level and quality (imperfect, to be sure) have been introduced. Expert evaluations from outside the department have been introduced for the most important kinds of products. It has been decided to orient planning and incentives toward the final results. What should be the final result of the activity of a management unit? Obviously, complete satisfaction of the needs of the national economy for the given kind of product (or the part of the need that is proportional to the production capacities of the given enterprise if this kind of product is produced by several enterprises), exports calculated on the basis that its share in the foreign markets should be no less than that of the immediate competitor (taking into account the comparability of the production units), and profit per unit of exported products that is no less than that of the competitor's.

However it would be unrealistic to think that simply a change in planning according to the presented proposals would automatically means their realization. Very many associations and enterprises are simply not prepared for waging a competitive battle, and the psychological factor has a great deal of significance here. Moreover, the system of material incentives must be radically restructured. I am not even speaking about the technical and organizational aspects.

The decisive word in evaluating product quality belongs to the consumer, without whose approval any charts of levels, any conclusions concerning the ability of a product to compete, show only incompetence or the lack of conscientiousness of the people who drew them up. The state is interested in differentiating the contribution of each individual economic unit and is constantly monitoring this amount, using as a basis the highest world achievements in the area of production and export of the corresponding kinds of products.

The purpose of creating associations was certainly not merely to reduce management personnel, centralize services and so forth. It was effective to create only associations which are capable of competing with the leading foreign firms. Only in this case can we utilize more fully the advantages of the socialist system of management, for no private firm or stockholding company can compete with an organization that relies on the power of the state, is supported by the state and belongs to it.

Of course, the proposed criteria comprise an exceptionally complicated matter. It is necessary to solve a multitude of problems at all levels of management. The level of the associations and enterprises will be affected most seriously. It will be necessary to reform many existing associations and to form new ones, and to change their structure, organization of production, all the activity of the staff services and many other things on the basis of the conditions of the task that has been set. This kind of restructuring, not to mention the changes in the nature of the activity, will inevitably affect the interests of many managers of the middle and high levels. Under the conditions of this kind of competition mediocre work will turn out to be intolerable. Therefore it will be necessary to solve again the critical problem of promoting management personnel. Talent!--we repeat--talent!

It is also impossible to do without special incentives for managers. In this case the responsibility and the risk are immense. Because of the increased requirements placed on them, it seems expedient:

to sharply increase the rights and independence of the managers;

to increase the amounts of material remuneration for the results of economic activity, primarily for the exports;

to introduce honorary titles, awards and benefits for the best managers, with them being the only ones who have the right to receive them.

The readers will probably suggest other forms of incentives and public recognition. This article has presented only a couple of considerations. Obviously they are debatable. But there is no doubt about the need to search.

FOOTNOTES

1. Lanskoy, V., "They Have Received in Order To Write Off," SOTSIALISTICHESKAYA INDUSTRIYA, 10 March 1983.
2. V. Kapelkin, "On the Scales of the Economy," TRUD, 26 February 1985.
3. Lenin, V. I., "Poln. Sobr. Soch." [Complete Collected Works], Vol 45, pp 15-16.
4. Ibid., Vol 39, p 235.

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DIFFICULTIES OF EDUCATING ENGINEERS RELATED

Novosibirsk EKONOMIKA I ORGANIZATSIYA PROMYSHLENNOGO PROIZVODSTVA (EKO) in Russian No 7, Jul 85 pp 115-122

[Article by V. I. Rybalskiy, doctor of technical sciences, professor, Kiev Engineering and Construction Institute: "How To Create an Engineer?"]

[Text] In recent years we have been bothered more and more by what has happened to occupational education, particularly VUZ and post-VUZ education. Now, after the adoption of the law concerning the reform of the secondary school, these issues are coming to the fore.

In fact there is something to be worried about. Thus according to materials of an investigation of young specialists conducted by the RSFSR Ministry of Public Health, "not a single one of the physicians knew what every physician should know." Yet in practically all of the medical VUZes 90 percent of the graduates pass the state exams with grades of "good" and "excellent." But here are the data for engineers. More than a thousand Leningrad engineer-planners were evaluated in terms of 18 criteria. Only every fourth one of them turned out to be comprehensively trained. And concerning the teachers: 80 percent of the teachers of physics and mathematics in the senior classes were not able to solve even the school problems for which they give grades of C.¹ As we can see there is reason to think that the quality of training of specialists is still far from what is desired. This conclusion resounds in the appeal of the eminent Leningrad executive and economist, G. A. Kulagin, to stop graduating "diploma'd ignoramuses" from the VUZes.

This means that we are not teaching correctly or at best, we are not teaching enough of some important thing.... What precisely? What can the young specialist not do or what does he not strive to know or learn?

Let us speak first about what he is unable to do. One can show without difficulty--and this has been done in literature--that the modern higher school is capable of using traditional methods to give a young person a sufficiently complete idea only about the objects that correspond to the concrete specialty, and to some degree teach him how to utilize the knowledge he has received in practice. For example, a student in a construction VUZ usually calculates and designs in practical studies or in a course project various parts of buildings and structures--foundations, walls, roofs.... Here

he uses the methods, formulas, algorithms and computer programs that are given to him. But this is undoubtedly insufficient for his forthcoming professional activity. When he comes to production yesterday's student immediately discovers that his work is not isolated but comprises only a small part of the whole. The results of his activity and the activity of his subdivision depend not only on the knowledge and efforts of the young specialist, but also on "associates" who sometimes have quite different interests. Instead of making decisions that are optimal from his point of view, it is necessary to make compromises, and this "did not happen" in the institute. At every step one can see probability at work in production, and interruptions take place because of unforeseen circumstances. One day the electricity was turned off, the next day a flu epidemic began, then the resources were delivered late.... Here it is where it is necessary to have that ability which is invaluable in production to act under unfavorable circumstances and to take risks. But they do not "go through" this in the institute, in other words, they do not teach collective occupational activity. They do not teach it not because they do not want to, but because this cannot be taught by traditional methods. We have before us a clear example--an army which has taken training not only in lectures and seminars, but also in maneuvers, without which it cannot be considered ready for battle. It is no secret that the application of principally new forms of training, for example, business games, makes it possible not only to develop the skills of future collective occupational activity, but also to essentially increase the interest in training--for its results are manifested directly in the classes. High results are also achieved with the application of effective training algorithms, means of programmed training, and so forth.

But is the fact that they did not "go through this" the only reason why the VUZes produce insufficiently trained specialists who do not have enough initiative? Does this not involve something more important than the need to use different didactic principles? All the students will hardly gain a desire to acquire skills and abilities as soon as new pedagogical ideas are taken up or the teaching becomes more interesting. In the first place, an immediate effect is possible in far from all studies--this is the exception rather than the rule. In the second place, it is still necessary to figure out whether or not today's activity of the students was brought about by a contrast, that is, by the fact that the new class, for example, game classes, is quite different from other, traditional classes. Perhaps if all of the classes were conducted in the same spirit, the interest would wane because they were customary and the same every day. In the third place--and this is perhaps the most important--most frequently for every "interest" there is an "even greater interest." For instance, the student is attracted by solving occupational problems or participating in business games, but he is even more interested in a football game that is going on at the same time or a forthcoming date. Obviously, in addition to simple "interest" and "results," it is also necessary to have something that can counteract everything that lures the student away, that is subjectively more attractive. And this "also," in my opinion, should be the deep, I would say, vital interest of the young person in achieving the goal which he has set for himself, fighting for his position as a student.

Today's student is well aware that if he has entered school and is not committing any special violations, even by "getting by with C's" he will be graduated as a specialist with a higher education. And under the conditions of the much-ridiculed, but extremely alive "percentage mania" it is not so difficult to obtain a C. For every teacher a B is a boomerang; it will return to him. The average student is aware of the trouble threatening the school administration because of the increased dropout rate and the failure to fulfill the plan for the output of specialists. It is no wonder that the dropout rate because of poor progress is extremely small. During the 1980-1981 school year for the regular form of training it was only 1.6 percent of the overall number of students.² In general the student understands that his goal--the diploma--can be achieved without hard creative work. I am afraid that without a vital interest, if we were to introduce "free attendance" the student might not come even to the most attractive class which produced the best results.

In my opinion, the essence of the problem lies here. Its solution, of course, does not preclude, but presupposes increased interest on the part of the student in his studies. Such progressive methods as training algorithms, programmed training, business games, analysis of situations and so forth can help to make these studies truly productive.

The lack of permanent interest on the part of many students in augmenting their knowledge and assimilating skills and abilities--this is the main obstacle on the path to training highly qualified specialists--can be overcome if one links obtaining a diploma to complete devotion of the student during the period of training and the need to master the material stipulated by the program deeply and quickly, and to go beyond its framework as much as possible. How one achieves such self-sacrificing study is another question, which can hardly have a simple answer. The author has already made an attempt to substantiate certain suggestions.³ Their realization will require:

changing the policy for admission into VUZes;

changing the policy for admission into VUZes;

sharply increasing the number of people who are expelled, as a result of which the student will lose his confidence that entering the VUZ is already a guarantee of receiving a diploma;

creating on the basis of VUZes and technicums unified training complexes with a radical restructuring of the training plan;

allowing free attendance of classes.

On the basis of these suggestions the author in conjunction with A. F. Kravchenko, V. N. Pogoreltsev, N. A. Shebek and L. T. Shkelev, prepared and at the end of 1983 delivered at the Kiev Engineering and Construction Institute an imitation experiment of SINUS (stimulation of intensive training of students). Its essence was this. First, in two contingents of the fifth course of the construction department (approximately 100 students in each) one and the same lecture was given by the same instructor. The subject of the

lecture was the construction and calculation of network models that are more complicated than usual (alternative, generalized, determined temporal). The results of the assimilation of the material could easily be determined by the number of mistakes in the construction and calculation. Then a quiz was given in both contingents; each student was given an individual assignment. The only difference was that in one of the contingents--the main one--even before the beginning of the lecture certain conditions were discussed. They were associated with the fact that in this contingent, with certain simplifications, they were imitating training in a unified training complex which trained both engineers and technicians. They indicated the number of mistakes for which the student would be "eliminated" from the training institution, and also the number of mistakes which determined his "graduation" as an engineer or technician. Attendance of consultations and the actual participation in the quiz was voluntary, but the students who did not take it were given the same number of mistakes as the worst students in the academic group.

As distinct from the basic contingent, in the second contingent--the control group--there were no announcements except for the announcement of the forthcoming ordinary test for knowledge.

The results of the experiment were extremely indicative. While in the control contingent the average number of mistakes per one student was 7.44, in the basic contingent this number was almost cut in half. In the control contingent only 10.4 percent of the students succeeded in being "graduated" as engineers, and the "failures" reached 55.2 percent. At the same time in the main contingent 50 percent became engineers and the "failures" did not exceed 11.7 percent. In the main contingent many students came for consultation which was deliberately scheduled for their day off, and in the control contingent not a single one did. During the lectures many students in the control contingent were engaged in outside matters, talked or daydreamed; in the main contingent there were practically no students who did these things. Let us note that the experiment was conducted in contingents where active training is constantly used in the lectures.

The SINUS experiment was then repeated, changing the places of the contingents (the control group became the main one, and the main one became the control group); of course, the subject of the lecture was different this time. This was done in order that there would be no doubt that the distribution of strong and weak students would be approximately the same in the two contingents. And this time too the results turned out to be indicative: in the control group 28.4 percent became engineers and 54.7 percent failed, and in the main group these indicators were 60.8 percent and 11.4 percent, respectively. Of course the experiments that were conducted are certainly not sufficient; there should be hundreds of them and they should encompass various VUZes, specialties and periods of training....

Still, if under game conditions when the results of the quiz did little more than threaten the student, the difference in mastering the materials of the lectures turned out to be so significant, what would be the effect if we were to give training institutions the real possibility of weeding out all of the

careless and inept students and graduating some of the students not as engineers, but as technicians?

In reality nobody is suggesting simply granting poorly trained students the diploma of a technician. The industrial functions of an engineer and a technician have essential differences and therefore it will be necessary to radically restructure the training plans. We also know of foreign experience, for example, in Hungary, where a number of VUZes have conducted two-stage training of engineers. After the first 3 years some of the students are graduated as production engineers and the rest of them remain for another 2 years and become "creative" engineers.⁴ Another possible variant is changing over to simultaneous graduation from the VUZ of engineers of various categories with the distribution in work and the right to hold various positions which correspond to these categories. But in all cases one should provide for effective feedback in the system of "VUZ--production," including complaints about sending specialists of unsatisfactory quality to work. And in order for this feedback to function reliably it is necessary to have deep interest in it (and in general in highly skilled specialists) on the part of the consumers of the VUZ "product." In this situation the students would immediately feel that a diploma without any knowledge would be worth nothing and would produce nothing, and this would serve as a stimulus for hard work even under the conditions of free attendance. In turn, practically all of the instructors would be forced to conduct classes in a new way, extensively using training algorithms, business games, analysis of situations and other active methods. One should only warn against attempts to make this superficial and hasty, as long as it counts.

Thus years of labor of highly skilled specialists are required in order to prepare even one serious business game which imitates one or another aspect of the activity of the plant, mine or construction site. And then if the effectiveness of this game is not comparable with any other methods of training. Unfortunately, the fashion for business games has led to a situation in which various kinds of forgeries of business games are "thrown together" hastily in a couple of months, and sometimes even in weeks. The authors learned about one of these recently. The essence of it was that the worker Ivanov had spit on the foreman Petrov, who had offended him when closing an order for work that had been done. The foreman Petrov was being analyzed. Of course this is an extreme case of using the term "business game" in an incorrect way. But there are already innumerable so-called business games which are not too far from this example.... And all of them make their way into various kinds of all-union or regional catalogues of business games with unusual ease, and it is as though they acquire their right to citizenship along the way. By quite understandable logic the authors of these developments are against any kind of classification of methods of active training or certification of business games because the confusion is to their advantage. Yet the "game fever" and the use of this fashionable term in a way that is irresponsible or erroneous because of ignorance--is a guarantee that the method will be discredited. All one has to do to find examples of this kind of discrediting is to recall the ASU or programmed training, which has already suffered enough. Not only are business games discredited, but the idea is generated that they can be created fairly simply and quickly. The author has repeatedly been given requests to develop a new business game by

the beginning of next month or next quarter. This is essentially blatant ignorance, a lack of understanding of the fact that the creation of a real game is a creative process that lasts many years, a large complex of research and experiments. And if from the outside a well-developed game looks fairly simple and can be mastered relatively quickly, the developers are well aware that this simplicity is only "on the surface."

It is time for everyone involved in the improvement of postschool education to think seriously about the problem formulated in this article and to join together to solve it. Of course, new methods and means of training must be created and introduced into the training process, but the main thing is to provide for sincere and deep interest on the part of future engineers and technicians in professional knowledge.

FOOTNOTES

1. Naumov, L. B., "Legko bli stat vrachom?" [Is It Easy To Become a Doctor], Tashkent, "Meditsina", 1983.
2. Reznik, I. G., "What Form of Training Should be Preferred?", EKO, No 6, 1983.
3. Rybalskiy, Z. I., "Complaints...Against the Engineer," EKO, No 1, 1983.
4. Minayeva, N. V., "Approximating the Occupational Chart of a Specialist," EKO, No 7, 1980.

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VARIANTS OF ENGINEERING EDUCATION PROPOSED

Novosibirsk EKONOMIKA I ORGANIZATSIYA PROMYSHLENNOGO PROIZVODSTVA (EKO) in Russian No 7, Jul 85 pp 123-124

[Article by Yu. I. Tychkov, candidate of technical sciences, members of the EKO editorial staff (Novosibirsk): "Variants Are Possible"]

[Text] Modern production requires of the engineer more and more complicated and constantly updated knowledge and abilities. The existing system and many of the methods applied in training do not motivate the student to assimilate information actively and do not develop the ability for independent education; their activity is directly mainly toward listening, remembering and classifying concepts and definitions.

Mere appeals for activity and attentiveness, of course, cannot raise the level of knowledge. The entire system of education, including higher education, should take into account the peculiarities of the period in which we live and thus be mobile. The student should not so much acquire a sum of knowledge as master the ability to acquire it and to work independently with specialized literature. This means that it is necessary to increase sharply the demands made on independent performance of course and laboratory work and work of an applied nature.

A special role in the development of the future specialist is played by production practice at the enterprise. It should be a continuation of training, it should have a practical training nature and it should end with the evaluation of the student's work by specialists in the enterprise. Elements of formalism are especially intolerable here and in order to exclude them it is necessary to increase the responsibility of the VUZ for organizing the practical work.

It is possible to achieve a responsible attitude on the part of the students toward their studies by envisioning the possibility of failing up to 50 percent of them during the first 3 years (while retaining the overall number of students). Let us consider the following policy as a variant of the selection of future specialists. During the first year of training we reveal the occupational inclinations and interests of the students and, from the results of an evaluation of these and other qualities, there is a competitive advancement to the second course, in which the number of students is reduced

by 10-20 percent as compared to the first course. The students who have not been accepted into the second course have the right to noncompetitive admission to technicums (or the first courses of other departments or VUZes).

After the second course there is again a selection according to the results of training, practice and inclination for the occupation. The group admitted to the third course is again reduced by 10-15 percent as compared to their second course, and the students who are not included in this group have the right to continue their training in the third course of a technicum (or enter another VUZ without going through the competition). After the second year of training it is possible to have a one-time competitive transfer to senior courses.

It would also be useful to revise the policy for issuing diplomas and make it more differentiated. It would be expedient to take into account the points received by the students for independent performance of assignments in all course, where the results indicated in business (imitation) games and for the production practice and diploma work that is recommended for introduction into production. Relying on such a comprehensive evaluation, it would be possible to introduce diplomas of two levels, the conferring of which would give different rights and different salaries at the enterprise. For example, a graduate who had received a diploma of the second degree would have a salary of 20 percent less.

A graduate who has tried to acquire a diploma of the first degree but has been unable to do this "on his first attempt" should be granted the right within 1-2 years to again defend a diploma on a subject that interests the industry in which he has been sent to work. Then the enterprise sends an evaluation of his professional competence to the examination commission of the VUZ. Additionally, it is necessary to generally exclude automatic awarding of diplomas after "attendance" of a full course in the VUZ, and much higher demands must be placed on the defense of this diploma. If during the preparation of his diploma the recipient has not displayed firm and profound knowledge and skills (including during the prediploma production practice" he is given only a reference (certificate) that he has gone through the course of training but without mastering the corresponding knowledge and without receiving a diploma. This reference gives him the right to work as a probationer (with the payment received by an engineer with a diploma of the second degree or somewhat lower) and he can redefend his diploma on a subject recommended in production.

After 5 years of work it is expedient to grant the specialists the opportunity to increase (update!) their qualifications in short (4-6 months) courses. Thus a periodic special-purpose retraining of specialists will be introduced into the system of education.

It seems to us that such a system should also be extended to the technicums.

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ROLE OF SECRETARIES IN PRODUCTION EXAMINED

Novosibirsk EKONOMIKA I ORGANIZATSIYA PROMYSHLENNOGO PROIZVODSTVA (EKO) in Russian No 7, Jul 85 pp 125-137

[Review prepared by P. M. Boyko of the first scientific-practical conference in the USSR entitled "Organization of the Labor of the Secretary" which took place in November 1983 in Leningrad. Used in the review are papers by candidate of pedagogical sciences L. V. Vlasov, candidate of psychological sciences A. M. Zimichev, general director of the Lenfintorg Association V. N. Gladkov, director of SGPTU-16 N. N. Ryseva and others: "Resurrecting the Profession"]

[Text] We shall be speaking about secretaries; the wage rate and qualifications guidebook of positions of employees today does not include such a profession although it existed for 212 years--from 1720 through 1932. It was created by Peter the First when he approved the general regulations--the Charter of the State Civil Service. In 1914 secretaries were called "high-class specialists" and they received from 40 to 200 rubles a month.¹ During the first years of Soviet power this was an independent profession in the state staff. But then in 1925 the State Committee for Labor and Social Problems included all secretaries in the group of the office technical profile, grouping them together with typists, archive keepers and office workers. In 1932 the male secretaries, having retained their high salaries, were declared to be assistants and spokesmen for the managers. They were assigned organizational creative work. The women were left with typing and office work and were called secretary-typists of categories 1 and 2. During the 1960's this title was changed to secretary-typist and secretary-stenographer, and their mechanical functions were greatly expanded. It has not been possible to establish from archive materials just what brought about such a devaluation of the profession.

The profession has disappeared and only the position has remained. At the same time a psychological underestimation of secretarial activity has made itself manifest. Frequently this category of workers is regarded as people who thirst for power under the cover of the manager's authority. There are many popular films which exploit the image of the secretary who does nothing but sit around and gossip. We have begun to equate the secretary with the typist and stenographer, and not with the manager's assistant. But without a good assistant he would also have to take on the basic secretarial functions,

instructing the person in the receiving room to do the simplest task--telephone this person, run and get this, call this person, do not allow this person....

Yet life takes its own course. There are experienced secretaries, secretaries by vocation, who in their jobs go far beyond the framework of the functions of a secretary-typist. And managers value their initiative and support them with all the means at their disposal. Sometimes they deliberately violate financial discipline, promoting their low-paid (85-95 rubles a month) assistants to the highest of various positions--designer, engineer, foreman and so forth. The manager never wants to part with such a secretary. Even when he goes to a new job he frequently takes the secretary with him as one of his close advisers. It would seem that Peter the First was more farsighted than some of the reformers who followed him....

Because of the low pay and the prestige of the position which has been declining for several years, turnover of secretarial personnel is among the highest in women's occupations. And indeed the only activity that can be regarded as prestigious is that which does not reduce the worker to the level of an automated machine, but allows room for initiative. Greater ability expands the range of opportunities and makes the work more interesting and significant. Therefore typing should occupy an appropriate position as a skill which enables more complicated abilities--reference work, stenography, mastering foreign languages, speed reading, work with systems for entry information into computers, and so forth.

Who Is She, the Hostess of the Reception Area?

It has become customary that girls who have not gone through the competition for admission to a VUZ occupy a swivel chair in the receiving area. Perhaps secretarial duties are so simple that they do not require any special knowledge or ability? In the 1970's certain countries (Czechoslovakia, Hungary, the GDR, the United States, the FRG, France and Finland) actively engaged in the project of refining the duties of the secretaries and their position and role in management.²

According to the standards of the International Association of Secretaries (MAS), today the skilled secretary should save up to 40 percent of the manager's time. To do this he must personally take care of approximately half of the telephone calls, transfer another fourth of them to other workers, and give the necessary response or information to every fourth visitor. He must also be able to decide which of the papers that cross his desk should go to the manager and determine which of these are the most important; give certain instructions on behalf of his boss to services and coworkers and check on their execution; organize personal receiving and document it correctly, and so forth. It should be noted that among the 20 main duties of the secretary suggested by the MAS, stenography and typing are only in positions 16 and 18.

The secretary cannot get along with knowing the administrative and territorial division of the country and his city, the structure of state and party agencies and public organizations, all enterprises and institutions with which the given organization interacts, and also the structure of the

organization itself. It is also necessary to be able to figure out the rights, responsibilities and functions of the manager, his deputies and his head specialists, the peculiarities of their characters and interrelations with the boss, and so forth!

Finnish specialists think that secretaries gain authority and receive advancement and high salaries primarily because of their excellent knowledge of their institution and branch, and secondarily because of their knowledge of their occupation. One cannot be a skilled secretary without knowledge of the fundamentals of psychology and interpersonal relations either.

Being a secretary means to have the ability to express an opinion concisely, concretely and clearly verbally or on paper; to master perfectly high-speed recording and reading of information; to work with a computer terminal; to take shorthand and read it; and to type beautifully, devoting more attention to the quality of the format and the clearness of the print than to the speed.

Let us add to this an equally long list of requirements placed on the secretary as a person: a good memory for faces, voices, names, titles and telephone numbers; good hearing and eyesight; a long attention span and the ability to shift attention quickly without forgetting anything; the ability to grasp the essence of the matter immediately; psychological stability, politeness and openness; acidity, an inclination for monotonous work and the ability to be alone for long periods of time; conscientiousness, a sense of duty, reasonable caution, circumspection, honesty, a sense of humor, the ability to withstand emotional and physical loads, charm, tactfulness, the ability to control one's behavior, high self-organization, the ability to learn independently, orderly family affairs, and so forth.

Specialists in Czechoslovakia and the GDR think that any woman who applies for a high administrative or management position must go through the "school of secretaries." Otherwise (experience shows) there arises the parody of the manager in the form of a woman. If one looks carefully it becomes clear that many of the aforementioned personality traits are close to the ones that are required of a manager. The effectiveness of the activity of the organization as a whole depends on the mutual understanding and the smoothness of the actions of the "manager-secretary" pair--this idea does not even require proof. Hence it follows that the role of the secretary is important in the overall mechanism of the management of the organization, and that it is time to return the high prestige to this occupation.

Obviously, far from everyone is capable of meeting all the requirements placed on a qualified secretary. Consequently, it is necessary to have a correct preliminary selection of people capable of this activity. What do the specialists suggest?

Since one knows beforehand whom one will receive as assistants, during the time of the first conversation with the applicant one should try to determine her qualifications and inclinations, being oriented toward the data from the formal test, entries on her diploma or certificate, her labor books, what she says about herself and her former work, and so forth. Her abilities and compatibility can be revealed within approximately a year of working together,

and then only with the availability of daily exhaustive information (outside and personal) concerning the work of the secretary.

When hiring a secretary, like any other specialist, the manager must familiarize him with the duties, responsibility and rights of the job. In an order he must define clearly and unambiguously the secretary's position in the organizational structure as well as his authority. In an oral conversation he should reveal the methods and style of his work, his own habits and prejudices, and establish and personally carry out a policy of daily joint work. Only through joint efforts can the manager and his secretary establish the same way of thinking, which relies on mutual clarity, justice, attention, tactfulness and politeness. Here is a factor about which many managers forget. One can never achieve the same manner of thinking unless one creates for one's secretary a situation of confidence, in which his labor is appreciated, his initiative welcomed, and he has complete and reliable information about everything that concerns his boss's work affairs, including while he is absent.

In keeping with the recommendations of the Soviet psychologist K. Platonov, special tests have been developed for determining the suitability of one specialist or another for the position he holds. These can be used in part for selecting future secretaries. It would be good to recommend secretarial training only to those applicants who received fairly high scores on the tests. To be sure, there should be no flaws in the tests.

But this is in the future. And today in the enterprises and institutions of our country there are approximately 2.7 million secretaries of managers of all levels of management (in Leningrad and the oblast alone there are more than 12,000 of them). Unfortunately, more than 80 percent of them were not especially selected by anyone and, moreover, they have not even learned the fundamentals of modern secretarial work.

Training for Complicated Work

Today the technicums are training mainly personnel for offices in large enterprises and institutions, and the technical schools and vocational-technical schools are training skilled typists who have a knowledge of business correspondence and stenography. For instance, the 10 SGPTU's in Leningrad in 1983 graduated 346 typists and 94 stenographers. The basis of the training of the former was typing: during 3 years of training 2,269 hours were allotted to it in the training plans. And the students spend only 34 hours studying the fundamentals of their future occupation, and these are lecture hours. The ratio is 67:1. How does one explain this? First of all by the fact that the educators in these schools, as a rule, are former teachers of courses in typing and stenography and are quite unfamiliar with the fine points of secretarial work. In Leningrad as in other cities there is not a single training institution which graduates instructors and masters of production training for training secretaries. Nor is there any system for increasing their qualifications. Incidentally, in Czechoslovakia secretaries are trained by university graduates who have special training and frequently also have scholarly degrees.

Not a single one of the aforementioned SGPTU's of Leningrad has the necessary material base. There is complete chaos when it comes to typewriters, means of copying and multiplying documents, and communications. If all of the means from these schools were to be gathered into one place one would have a museum of inefficiency with respect to their needs. Now all of the enterprises where school graduates are sent use computer equipment extensively. But could a PTU teach secretaries to work with computer terminals? No. Why? All 10 of the SGPTU's have the specialties "secretary-typist" and "secretary-stenographer" which do not correspond to the profile or to the fundamental needs of the base enterprises. They need people in the main occupations and it is for the sake of these that they finance the training process, and secretaries are in addition to this. But when there are not enough students they are very necessary for fulfilling the plan for recruitment (not all girls want to be machine tool operators). Hence also the minimal wages for the specialty of "secretary." But how can one think about typewriters of the third generation (of the daisy wheel type) or word processors with display screens! The situation is no better in other cities (including Moscow).

Obviously we cannot get by without improving the system of training of this category of workers. Before issuing recommendations the Soviet specialists studied in particular the advanced foreign practice in this area. In socialist and developed capitalist countries secretaries are trained in special training institutions. In Bulgaria, for example, they are trained in secondary vocational and technical schools while in the USSR, Czechoslovakia, Hungary and the GDR they are trained in 4-year state economics schools and 3-4-year gymnasiums. Correspondence course training (3 years, 480 training consultation hours) and increasing qualifications in regular day schools are handled by the department for secretarial labor of the stenographic institutes of Prague, Budapest and Berlin. In Yugoslavia secretaries are trained in commercial-economics and special secretarial schools which are organized along the American model.

In the European capitalist countries this category of workers is trained in special schools and in departments of universities and higher commercial schools. The program for the Female Secretarial Technical School in Paris is intended for 3 years (preparatory, intensive training in the final year). Each year 300 people are trained according to a program for classical secretaries, and 100 of them go through additional higher training for work with documents. During the first year of training the thinking of the students is adjusted from school thinking to professional thinking, they are inspired with respect for their future profession, and the prestige of this profession is indicated. There is strict discipline in the school and beginning with the first days there is not the slightest bit of tardiness. They develop the ability to dress tastefully and in keeping with the occasion. The first year is ended with the preparation of a speech, "Mental Gymnastics," and preparation of documents in combination with solving practical problems and handling concrete situations. During the next 2 years the study of the material becomes deeper and the individual approach to training each secretary is strengthened.

In Finland secretaries are trained by the higher commercial school, the secretarial department of the state university and the modern school (with 2.5

years of training and 6 months of practice) which is located in Helsinki. Approximately 60 percent of the training time in the school is devoted to business games. A central place in the program is occupied by the course titled "The Science of the Secretary." This course takes 3-4 hours a week throughout the entire training period. During the class time constant attention is devoted to the behavior of the students, the ability to establish with comrades feelings of mutual assistance and good will, and also the knowledge of business etiquette. In practical studies skills are developed for conducting telephone and in-person conversations, drawing up the optimal route for the boss's business trip, working out a guest program and working with reference materials. The manifestation of initiatives and independence is valued highly.

The training program is not limited to purely secretarial work. It includes the fundamentals of bookkeeping, financial and legal questions, and the possibilities and methods of applying computers in modern secretarial work. The course titled "Office Business" considers in detail the kinds of office work and their significance, planning and equipping office premises, organizing work and ways of improving it, the latest office equipment and questions of managing personnel. Familiarity with the corresponding divisions of mathematics and statistics develops logical analytic thinking in the students. "Commercial Activity" is offered as a special discipline.

Graduates of the school have a good command of three to six foreign languages, can easily orient themselves in various conversational situations, and are able to prepare documents in foreign languages in keeping with the standard requirements of the corresponding country. Therefore it is no wonder that the demand for Finnish secretaries is very high in Western Europe.

Soviet specialists think that it is desirable to train secretaries at two levels--higher and secondary. The higher level involves 4-5 years of training in special departments of engineering and economics VUZes and in the State Historical Archives Institute. The profession provides diplomaed secretaries for managers of associations, ministries and departments. The secondary level involves 2.5-3 years of training on the basis of technicums and PTU's, and the profession is secretaries of managers of enterprises, institutions, divisions and shops. This kind of division is necessary. As a questionnaire showed, the duties of the secretary of a deputy minister are 2.5 times more complicated and broader than those of the secretary of the director of the scientific research institute, and the secretary of a general director of an association has 1.3 times as many duties as the secretary of the chief of a large shop. (But the existing organizational and financial documents constantly insist that all secretary positions in the branches of the national economy are equal.)

The construction of the two-level system of training secretaries in the USSR requires a good deal of time and money. It is necessary to train instructors as well. But even today specialists are changing over from words to deeds. In March 1984 the main administration of vocational and technical education in Leningrad and the oblast issued instructions concerning the initial measures for creating on the basis of the SGPTU-16 a specialized school for training secretary-typists and stenographers. Among them will be two "purely

secretarial" groups. In order to accomplish this the other nine SGPTU's of Leningrad must transfer their secretarial groups to this school and handle the basic professions. But the main board is in no hurry to take on these responsibilities. This can perhaps be understood. On the one hand they are afraid of active resistance from the directors of the SGPTU's who are unwilling to give up their secretarial groups which are advantageous during the period of recruitment. On the other hand it is difficult to find an enterprise or group (with shared participation) which would take SGPTU-16 under its financial wing since all of them at least have secretaries, but there is always a critical shortage of machine tool operators. The training and training-methodological issues have basically been resolved and coordinated, and the necessary instructors have been selected. The problem lies in carrying out the orders of the main board.

The idea of opening such a school precisely in Leningrad is no accident. In January 1983 at the Leningrad oblast division of the RSFSR pedagogical society the first section on methods of teaching secretarial skills was created in our country. It was headed by Candidate of Pedagogical Sciences L. V. Vlasov. The bureau of the section began to join together the working secretaries of the city and oblast (today there are more than 1,100 of them in five subsections) as well as the instructors of the PTU's which produce typists and stenographers into a professional association.⁴ Through it they arrange regular courses for increasing qualifications. In the stage of the technical assignment they develop requirements for the duties, knowledge and abilities of a secretary, and in the plan--official instructions for various groups of secretaries. In 1983 two brochures were published in the series "Methodological Recommendations for the Secretary" and new ones are being prepared. To be sure, the addition of the brochure--500 copies--is clearly inadequate.

Preparatory work is being done for improvement of secretaries in the SGPTU. This work includes a method of accelerated training which was developed by a group of Moscow scientists under the leadership of V. V. Petrusinskiy. Here, for example, is how accelerated typing classes are conducted. These classes last no less than 9 hours a day. The complex of programs (each one is 70 minutes long) is recorded on a tape and on movie film. Against the background of music with an accelerating rhythm one hears the voice of the director reading a text. This text in a set rhythm is to be typed by the students. The rhythm is also set by the sound of the typewriters which is arranged on a musical background. The students hear the program through stereo headphones. they type on electric typewriters with blank keyboards, on which various colors indicate only the zone where each finger is to operate. From the movie programs on the screen they project the keyboard of the typewriter with an indication of the letters and the necessary words. On the keyboard a beam of light depicts the trajectory of the printing of these words with a speed of 360 symbols per minute. The projection is accompanied by rhythmic music and a sound signal. The trainees try to type with maximum speed on dummy typewriters. The work is broken up with breaks for tea and mobile games. The interior of the room for resting has been thought out down to the last details.

The laboratory for automated systems of accelerated vocational training of the All-Union Scientific Research Institute of Vocational and Technical Education, which is headed by Candidate of Psychological Sciences A. M. Khimichev, has been testing this system experimentally for 3 years. The results are promising: during 4-5 days the students learn to type with a speed of 140-170 letters per minute (at the level of graduates of vocational and technical schools). Medical-psychological research and questionnaires show that the training does not push the limits of human capabilities at all. Moreover, many students respond to the experimental training course as if it were a rest.

In the laboratory programs are created for accelerated automated teaching of typing, dictaphone transcription and the fundamentals of programming (a unified course in which typing is the unifying activity which serves all the rest); foreign languages (English, French or German language taught at the level of communication, and reading is mastered in 10-12 days). It is also planned to develop a program for high-speed teaching of the Russian language as a skill which contributes to intelligent work with documents and the printing of these.

In the opinion of Prof V. V. Petrusinskiy, the effectiveness of training using this method increases tenfold as compared to the traditional method, and the knowledge is fairly stable. Even without any practice at all no more than 40-50 percent of it is forgotten in a year.

Workers of the laboratory for automated systems of accelerated vocational training think that their system can be used successfully both in specialized vocational and technical schools, for whose opening they have fought, and when increasing the qualifications of secretaries who are heavily loaded with work. In the middle of 1984 by order of the Main Administration of Vocational and Technical Education in Leningrad and the oblast, this laboratory was territorially located in SGPTU-16 so that the problems of the new school could be handled directly.

Addition to Qualifications

Hardly anyone would object to the idea that with the modern rates of scientific and technical progress even a skilled secretary must engage in self-education and regularly raise the occupational level. What kind of will power would be needed, for example, for the secretary of the head engineer of a large association who is very busy to engage in self-study even an hour a day and then for 2-3 months! We must place our hopes in organizational retraining. But how do things stand in this sphere?

So far Leningrad is the only city in our country which has accumulated experience in increasing the qualifications of practical secretaries. In 1974-1975 in one of the Leningrad institutes for increasing the qualifications for the first time 870 secretaries were invited for 2 weeks of training. During 1976-1980 1,070 secretaries of managers in Leningrad and the oblast increased their qualifications by attending 10 lectures in the central lecture hall of the Znaniye Society, and 210 of these were secretaries of top managers while 845 were secretaries of head engineers, managers of structural

subdivisions and their deputies, and 15 were in charge of offices and were chiefs of general divisions.

Why were there so few secretaries of high-level managers, even though the training was intended precisely for them? When the secretaries themselves were asked they gave these reasons:

the manager would not allow them to take the training because he thought it was a waste of working time and did not believe that the secretary would be able to increase labor productivity;

they had no desire of their own to study. As a rule, secretaries who have worked for more than 15 years and also those who have worked for less than 2-3 years do not wish to attend classes. They refer to how busy they are at work and at home, their great deal of practical experience, to which training could add very little, or else they refer to the fact that they are old enough to go on a pension soon.

The plans for the future include comprehensive preparation of a unified policy in the country for taking the examination for the title "professional secretary." Such an examination is already being used in many countries. Having passed it the practical secretary receives a special diploma and the prestigious right to place after their signature on documents the letters DPS (diplomaed professional secretary). Such a secretary can count on a high secretarial position and a high salary. The examination is very complicated and, as a rule, it lasts for no less than 12 hours. With the help of special tests one can reveal the level of knowledge and ability of the secretary, how fast he works, that he pays attention to his appearance, business qualities, relations with people, and so forth.

We too have a need for such an examination since we must finally learn to select the most capable secretaries, who are able to handle administrative situations well, who can make independent decisions, make business proposals, give advice and so forth. This way we will form a worthy reserve for responsible secretarial positions.

There is much left to do before the managers receive qualified assistants to whom they can confidently delegate some of their authority. It is necessary to increase the prestige of the profession, to increase the wages of diplomaed secretaries, to arrange for thorough training of them in various categories, to strengthen the material base of the corresponding training institutions, to publish special textbooks and methodological literature, to train pedagogical personnel, to improve the system for increasing the qualifications of practical workers and so forth. It is gratifying that the first steps have already been taken in this direction.

FOOTNOTES

1. "Stenograf-traktik" [The Practical Stenographer], St. Petersburg, 1914, No 1, p 29.

2. This change in the role and position of American secretaries under the conditions of automation is discussed in an article by I. V. Serafimova which was published in EKO, No 2, 1985.
3. Such associations are operating successfully in various countries. For example in Finland there are two national secretarial societies (NSO). Each one includes approximately 1,000 members. The society can be entered by secretaries of managers who have been working for no less than 3 years and have recommendations from long-standing members. About 83 percent of the secretaries included in the NSO have higher or secondary specialized education. Each winter the society creates courses for increasing qualifications, paying for rent on the premises and for the work of the teachers.

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UPDATING OF REFERENCE INFORMATION URGED

Novosibirsk EKONOMIKA I ORGANIZATSIYA PROMYSHLENNOGO PROIZVODSTVA (EKO) in Russian No 7, Jul 85 pp 138-141

[Article by V. G. Ramm, candidate of technical sciences, Leningrad branch of the GipronIIPoligraf: "Genetic Modernization of Reference Work"]

[Text] Why does the reader need a reference work on semiconductor devices, construction designs, operations systems or printing processes? So that in his work he can be oriented toward the modern level of technical equipment, design decisions, introduced technologies and instruments and devices that are being produced now and not years ago.

When determining the number of copies of the next edition of a reference work the publisher is faced with a choice: to orient himself only toward the unsatisfied demand or toward all potential consumers, hoping that all of them will replace their old books with new ones? The second variant is excellent but it requires so much money that it is better to forget about it immediately. And in the first variant the majority of the consumers will be left with outdated literature.

One way is impossible and the other is bad. But the first path is more realistic.

And outdated technological processes are included in the plans, obsolete equipment is ordered for new enterprises, and norms are established without taking into account the latest achievements of technology. The collision with the reference works is similar to the old collision with the machine tools. For instance, the consumers were forced to resolve independently the question of the most expedient rates for updating machine tools. Practically everyone was convinced of the need to update them as quickly as possible. But still it was a pity to throw away this specific machine tool--let it serve a little longer, it is working (and let it hold up progress, taking resources away from the new equipment). The machine tool builders came to the conclusion that with the gigantic scale of machine building (as, incidentally, is also true of other branches) the national economy is not capable of updating equipment only through replacing it. Therefore it would be expedient to envision modernization of many machine tools even when they are being designed.¹ We are speaking about genetic modernization, or the module principle. Its

essence is that the elements of the new models can be combined with the old base, and this becomes a continuous process.

The idea of genetic modernization is equally crucial for reference literature, the more since now automated publishing systems are developing actively. In particular, the Leningrad branch of the GiproNIIPoligraf has developed a dialogue publishing system (DIS) on the basis of our minicomputer, and it is already being used by certain publishing houses. The publication that is being prepared is stored on a magnetic disk. The publishing house worker, using a program module (dialogue editor) can while sitting at the terminal edit and correct the text without any intermediaries: he can move, remove or add to pieces of it, replace one sequence of symbols with another, and so forth. Individual elements of the text are easily set off by different type sizes, italics, the line format, justified margins, embellished script, and so forth. Here the interactive format module which is controlled by the correcter automatically makes sure that each part of the future book maximally satisfies the established rules.

So far these remarkable possibilities are being utilized only for one-time preparation of the transparencies of the typed page of the future publication. The matter never went as far as republication. Yet it is precisely reference literature that has long been waiting for such technology, which would make it possible to update it quickly (that is, augment it with new information, remove outdated data, correct it, modify it and so forth) and then republish it. If the publication that has already been marked, formed into pages, proofread, checked and rechecked is on a magnetic disk, it makes sense when preparing transparencies for print to keep it on a disk. This is quite a different approach to republishing and disseminating reference books.

Three coexisting variants are possible here. The first--traditional: the publication goes through the photo offset machine onto transparencies, photographic forms are manufactured, they are reproduced, bound and distributed through bookstores. The second variant--subscriber service and updating of reference literature while in the hands of the user. Here the reference work is not rebound, but is an orderly set of individual pages. The reference information is updated not once every several years, but constantly. The new pages can easily be formed with the publishing system. The appropriate changed pages are sent to the subscribers. Incidentally, for several years individual ministries have been updating departmental normative documents at their own enterprises in precisely this way.

In the third variant the user will be able to obtain a hard copy himself. But the publishing house will be concerned about constantly updating the reference work on the territorial magnetic disks (first using floppy disks, and then through the telephone channels). The rapid improvement of communications equipment² makes it quite possible to have automatic communications between two computers--that of the publishing house and the territorial magnetic disk files. The latter, acting as a bibliographic collector, could, in turn, update the data bases in the users' magnetic storage files. From these the data could also go directly to the work station of the users, and depending on their needs, the necessary information could be displayed on the screen of the terminal, on paper or on a transparency.

Domestic equipment which provides this kind of information service is already being series-produced. Third-generation computers (with direct access and time sharing) and systems for controlling data bases are becoming widespread, and dialogic publishing systems based on computers are appearing. The publications are more and more frequently being formed on computer carriers. The time has come to standardize the computer versions of these editions (mainly reference work) and reserve the computer carriers so that in the future the reference publication center can use them to promptly update information for numerous users. It will also be necessary to organize a unionwide system of information (reference) service which provides for genetic modernization of reference works on the spot--where the users work.

This, in our opinion, is the way the modern updating of a necessary book, mainly reference works, should be. To be sure, they will not be standing on bookshelves, but will be located in the computer, but this is already a commonplace.

We can see the disenchantment of the printers: "Some kinds of disks, distribution bases.... All this might be good, but we need a plan to fulfill in printed sheets, color prints, accounting publication sheets and conventional printed sheets, a plan in terms of the gross output and sales." But the consumer does not need printing sheets or a sales plan,³ but the latest information about the state of affairs in his sphere, which will help him to work on a modern level and promote scientific and technical progress. How does one arrange it so that what will be advantageous to the state will also be advantageous to the printers? This is a separate problem which awaits its own solution.

FOOTNOTES

1. See EKO, No 1, 1982, p 34.
2. In our country we are actively using the "Orbita" system, which makes it possible, in particular with the help of satellites, to print central newspapers in the local areas. The communications equipment is also helpful when centralizing the publication of regional newspapers.
3. Let us recall that we are speaking here not about artistic literature (Plutarch and Tolstoy do not need to be updated), but about reference literature.

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UTILIZATION OF SECONDARY METAL RESOURCES URGED

Novosibirsk EKONOMIKA I ORGANIZATSIYA PROMYSHLENNOGO PROIZVODSTVA (EKO) in Russian No 7, Jul 85 pp 141-145

[Article by V. I. Dyakonov, candidate of technical sciences, Ural Polytechnical Institute (Sverdlovsk): "A 'Second Wind' for Vtortsvetmet"]

[Text] The utilization of secondary resources leaves something to be desired so far. The situation is especially unfavorable with respect to secondary nonferrous metals. One of the main reasons for this is the poor work in this area on the part of branch scientific institutions. Thus up to this point they have not developed scientifically substantiated methods which would make it possible to plan the volumes of procurements of secondary nonferrous metals. Nor are there any standard methods for determining the effectiveness of their utilization. At enterprises of the USSR Ministry of Nonferrous Metallurgy and their consumers there are no scientifically substantiated normatives or technological processes for the utilization of secondary raw material. The material and technical base for procurement organizations is poorly developed and up until recently only 0.8 percent of the overall volume of capital investments in the branch went for its expansion and construction.

This attitude toward Vtortsvetmet means that nonferrous metal procurement workers do not make a large contribution? No, approximately 20 percent of the overall needs of industry for nonferrous metals are covered through secondary raw materials. Today the proportion of nonferrous metals obtained from scraps and wastes amount to the following: for aluminum--20 percent, copper--30 percent, lead--28 percent, and zinc--18 percent of the amount consumed.

So far the country does not have enough production capacities for processing. Moreover, a considerable proportion of the nonferrous metals are simply thrown away. For example, household equipment (obsolete or unusable refrigerators, washing machines, vacuum cleaners and other household machines) are not included in the procurements of nonferrous scrap metal, and this amounts to 60,000 tons of aluminum a year. Another 80,000 tons of aluminum could be acquired by collecting food cans and packaging for food products and household chemicals. From the various kinds of batteries that are thrown away everywhere it would be possible to acquire 20,000 tons of zinc a year. The technology for extracting metals from such household objects has been

developed, but the procurement workers and the metallurgists are still not capable of taking advantage of this significant reserve.

The situation is even more complicated when it comes to television sets. More than 2 million old television sets come into the country's receiving points each year. This amounts to 3,000 tons of copper, 1,000 tons of aluminum, 130 tons of tin, 100 tons of nickel, a considerable quantity of cobalt, silver and gold, and also 18,000 tons of glass, 9,000 tons of wood and 2,000 tons of plastic. In monetary terms this adds up to many millions of rubles. But so far from each television set we have learned to extract up to 3 kilograms of not very high-quality copper, and all the rest of the materials are burned or thrown away. We also need to learn to salvage old radios, telephones, calculators and complicated electronic equipment. Now practically all of this is thrown away.

During the 10th Five-Year Plan the country gathered and reprocessed a good deal of nonferrous scrap metal and wastes. The assortment of utilized secondary metals was expanded: while in 1950 there were only seven kinds, in 1980 there were 22. The volumes and quality of this work also increased under the 11th Five-Year Plan. But still the achievements of Vtortsvetmet and the Ministry of Nonferrous Metallurgy regarding this are still modest compared to the reserves that exist. Scrap metal and wastes of nonferrous metals still do not provide a sufficient proportion of the overall volume of initial metals, chemical products, rolled nonferrous metals and alloys.

One cannot but be bothered by the fact that the quality of secondary raw material is gradually deteriorating since alloys of various grades are mixed in and only a few enterprises (little more than 1 percent of the overall number) have specialized shops and sections for processing secondary nonferrous metals. Thus the Sverdlovsk Interoblast Vtortsvetmet Production-Procurement Administration receives nonferrous scrap metal from 2,345 enterprises and organizations of Sverdlovsk and Tyumen oblasts. But only 30 percent of the nonferrous scrap metal and the Ural plants and even less at the Tyumen plants go for primary processing. Each enterprise that supplies scrap metal in a volume of more than 50 tons per year should have its own section or shop for initial processing. So far they exist only at enterprises of Sverdlovsk Oblast. Most of these shops and sections have various kinds of nonstandard equipment which has been manufactured or adapted for these purposes through their own forces. They have various number of workers: from 18 at Uralmash (the annual volume of processing--2,000 tons) to 1-2 people at the perfume factory (60 tons).

At Uralmash all wastes are classified and a policy has been established for gathering, grading, storing, processing and releasing them, and also for control over their utilization. And, of course, it is easier for this giant enterprise than it is for many others to provide its processing shops with the necessary equipment. Apparently the smaller enterprises require cooperation and specialization in everything, beginning with the equipment and ending with the release of the scrap metal.

Uralmach releases 79 percent of the overall quantity of its wastes to Vtortsvetmet and it utilizes the rest for its own purposes. As a result of

the well-arranged technology in the organization of this work, Uralmash releases high-quality wastes which are based on copper (copper, brass, bronze), whose volume reached 98 percent in 1983, that is, practically none of the copper was thrown away.

We should note that the population alone throws away up to approximately 150,000 tons of nonferrous metals: each ton of household wastes includes up to 30 kilograms, and each year the population of the country throws away more than 50 million tons of solid wastes. In the structure of the wastes and scraps of nonferrous metals the proportion of household scraps amounts to 8-9 percent, amortized--more than 30 percent, and industrial wastes (shavings, stamping scraps and so forth)--60 percent.

From these figures one can see that the Soyuzstortsvetmet VPO, which has 288 shops and sites for receiving and initial processing of secondary raw material for 16 metallurgical plants, should more rapidly improve the system of collection and the technology of processing, and also increases production capacities. But the facts that only part of the secondary nonferrous metals are being put to use, that there is a shortage of capacities for obtaining primary raw materials, and that they are being imported show the slow progress of the VPO. This is exacerbated by the poor quality of processing of raw material at enterprises of Soyuzstortsvetmet. They would gain a second wind if their activity were planned systematically. But this kind of planning does not exist.

They have not arranged for gathering and evaluation of information concerning wastes from production and consumption. Information about the kinds, volumes and sources of raw material and about the possibilities of utilizing and selling them is fairly approximate and unsystematic. Planning is based not on the actual condition of the supplies of secondary raw material and not an orientation toward a high degree of its utilization, but on the level that has been reached during the past planning period. It is necessary to have information banks compiled with computers. The data at the disposal of the organizations and enterprises of Soyuzstortsvetmet do not reflect the entire complex of questions (organizational, technical, economic and social). For example, if the sources of secondary raw material are a long ways away from the places where they are processed, most of the efforts of the procurement workers go for solving the transportation problem.

It would probably not be worth while to delve into the problems of Vtortsvetmet were it not for the clear advantage of obtaining nonferrous metals from secondary raw material over processing primary raw material (ore). This advantage consists in the savings: one needs less in raw materials, processed materials, fuel, electric energy and capital investments. Thus the production cost of aluminum obtained from secondary raw material is 26 percent lower than that extracted from primary raw material. The possibility of not expanding mining and enriching enterprises and not spending considerable amounts of money on geological prospecting--this is the primary advantage produced by secondary nonferrous metallurgy. In order to obtain one ton of aluminum, for example, it is necessary to have 6.2 tons of primary raw material and only 1.4 tons of secondary raw material. Hence there is an obvious savings on transportation expenditures, which are fairly great in the

Ministry of Nonferrous Metallurgy because of the distance of the deposits of nonferrous ores. The production of nonferrous metals is very energy-intensive. Yet in order to obtain one ton of aluminum from secondary raw material requires only one-twenty-third (!) the amount of electric energy required for producing the same ton from ore.

Secondary nonferrous metallurgy does not yet have a production structure in which the main product is aluminum alloys (60 percent of the products of enterprises of Soyuzstortsvetmet). Their production from secondary raw material will save millions of tons of bauxites and nephelines, several billions of kilowatt-hours of electric energy and 40,000 railroad cars. The level of profitability of the production of aluminum from secondary raw material is 7-10 times higher than from ore. And on the whole the proportional capital investments in the development of the production of metals from secondary raw materials are one-eighth the amount required for primary metallurgy.

It is possible to give many figures which convincingly show the advantages of the development of secondary ferrous metallurgy and procurement enterprises. But progress will take place in this area only when the attitude toward it changes radically, when many thousands of tons of secondary nonferrous metals are no longer shipped to the dumps. It is also necessary to change the attitude of branch science toward these problems. It will undoubtedly be necessary to have a good deal of restructuring within the branch, above all the national economic approach to the development of Vtortsvetmet, which is not being applied, external appearances notwithstanding. Openly relying on the utilization of the limited quantities of natural resources of almost all of the nonferrous metals and on the importing of ore leaves untouched many reserves within the country which are lying literally on the surface.

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SYSTEM OF ACCOUNTING FOR REPAIR WORK SUGGESTED

Novosibirsk EKONOMIKA I ORGANIZATSIYA PROMYSHLENNOGO PROIZVODSTVA (EKO) in Russian No 7, Jul 85 pp 145-147

[Article by A. N. Popov, candidate of economic sciences, Institute of Economics of the Ural Scientific Center of the USSR Academy of Sciences, and V. N. Popov, engineer-mechanic (Chelyabinsk): "Cards for Keeping Track of Repairs"]

[Text] Investigations conducted in Chelyabinsk Oblast on the initiative of the CPSU Obkom in 1978 and 1982 showed that at the leading enterprises special attention is devoted to calculations based on the need for materials which are required for repair and on the drawing up of orders. For this purpose special cards are introduced to keep track of the condition of the units being repaired. At certain enterprises the figures from the cards are entered into computers. This makes it possible to draw up substantiated orders, to adjust the peak of the need for funded materials, and to change the repair schedules with impermissible limits, taking into account the uniformity of the loading of the brigades.

The front side of the card looks like a table and contains the following columns: the number in the plan for planned preventive repair (PPR), the number of the certificate, the name and place of the installation and the number of the inventory unit, the cost, the year of installation, the group of repair difficulty, the time norms for repair and technical service, the figures and norms for amortization deductions, the kinds of repair in the various years and months, the age of the equipment and the percentage of wear and tear. On the reverse side of each card one lists the materials which are needed for repair, the numbers of the ordering departments, the time period for their release, and other data.

This question can be quite legitimate: Why is such a card needed if there is a certificate for each repaired unit and the bookkeeping office keeps track of all the fixed capital?

In the first place, the card does not take up much space and is convenient for finding and entering changes and revisions. And the certificate does not contain all the data necessary for operational accounting for the condition of the repaired units. In particular, they do not contain the norm for

amortization deductions for capital repair and renovation of the active part of fixed production capital and there is no long-range schedule of repair.

Nor does bookkeeping reflect all of the changes that take place in the inventory unit. Moreover, it does not encompass the less valuable equipment (costing up to 100 rubles), instruments or fittings for which amortization is not calculated. But they require repair as well! Therefore there are essential advantages for the repair services of the enterprises to have cards indicating the condition of the inventory units.

For example, orders are being drawn up for materials for 1985. To do it is necessary to select the cards which have displayed in red the deadline for capital repair for 1986 (month). The materials are ordered a year in advance because their delivery may be put off until the end of the year and the repair work begins with the first quarter of the planned year.

From the information contained on the cards one determines the quantity of materials necessary for planned repair and adds to this the materials which could be needed for nonplanned work, and then the unused material at the time the orders are drawn up or subtracted. And this would be the substantiated order for 1985.

The card can be used when drawing up the annual schedule for planned preventive repair and reports for the USSR Central Statistical Administration. It can be used when conducting work related to the introduction of new time norms and also when combining repair with technical certificates for repair and transportation equipment, and when accounting for the load and coefficient of shift work. Thus in order to draw up the schedule for PPR it is sufficient to fill in on the blank schedule the dates of repair for the planned year. The utilization of the card accelerates drawing up the schedule approximately sixfold: it is easier to enter the repair cycle onto the card once than it is to fill it out annually on random sheets of paper.

On the cards for uninstalled equipment an entry is made to "sell" or the place and date when it should be installed are registered. This material is sufficient for drawing up reports on forms of the Central Statistical Administration.

Thus with the introduction of a card there is a real possibility of considerably improving accounting and organization of repair and obtaining a savings on material resources and labor expenditures in all links of the chain of "repair-supply."

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INNOVATIVE JOURNALISTIC WORK LAUDED

Novosibirsk EKONOMIKA I ORGANIZATSIYA PROMYSHLENNOGO PROIZVODSTVA (EKO) in Russian No 7, Jul 85 pp 148-167

[Article by Aleksandr Levikov (Moscow): "A Master of His Trade"]

[Text] The essay you will read below is not altogether typical of our magazine: It is not about a director, not about a designer nor about a scientist. But it is about an innovator. A journalist innovator whose name is well-known both to people in production and people in science. It is Anatoliy Agranovskiy.

Many of the critical topics raised at one time or another by Anatoliy Agranovskiy have been touched upon and continue to be touched upon on one plane or another in EKO, and they have been developed to a certain degree. He has formed public opinion, and among specialists, managers and scientists there are many people who have been educated on the truthful and talented essays of this remarkable master of commentary. The magazine VOPROSY LITERATURY has given its due to the artistic side of Anatoliy Agranovskiy's creativity, and we also would like to emphasize his immense role in the matter of public interpretation of socioeconomic problems in the life of the country during the most responsible periods which are involved in the search for new ways of economizing and restructuring human psychology in this sphere.

When saying good-bye to Anatoliy Agranovskiy I was suddenly struck by the thought: he is almost a contemporary! During my youth this never entered my mind. For us who did not know him personally he was older. A teacher. A master.

I recall how we persuaded an editor who had refused to accept something in our text: "Agranovskiy wrote about this!" I recall what a royal compliment it seemed to be when one critic wrote on a flier: they say that it is in the style of Agranovskiy.

"Do not create an idol for yourself...."

Probably someone will say that our admiration betrayed a certain lack of experience or even confusion against the larger picture of history. But this was rather something else. During those turbulent 1960's, when we singled out Anatoliy Agranovskiy's essay from the flow of publications of central newspapers, there were many other articles on which we did not bestow praise but abused with the impatience of youth. It was only Agranovskiy's authority that was recognized without question.

How does one explain the phenomenon of such success? Why does one commentator or another in a certain time segment suddenly become the master of ideas? And after his heyday he usually writes just as well, and as the years go by he has a selected circle of readers, but the majority of readers are waiting for something new. They are ready to return to a previous love or loudly welcome another--the one who is saying....

But what must one say in order to become an idol of the reading public in a country with many millions of people? Does one feel public pain as if it were one's own? How does one bring a freshly written piece that has just come from one's pen up to the extreme edge of actuality when, in Herzen's words, "It is necessary to print now or not print at all because even now it is late"?

During the war many talented authors wrote about the war. But it was only the newspaper with the article by Ilya Erenburg that the soldiers refused to allow to be used to roll cigarettes.

The press was filled with so many good essays about life in the country after the war! But only the column entitled "Everyday Life in the Rayon" by Valentin Ovechkin burst powerfully into our awareness. Yevgeniy Nosov said that at some stop he had missed the last train and was forced to spend the night in a haystack--he could not tear himself away from the loudspeaker that was broadcasting the latest installment in the Ovechkin series.

I daresay that during the 1960's Anatoliy Agranovskiy's articles had no less of an effect on the public: "Sergeants of Industry," "Waste of Education," "Ivan, Gavril and Danilo," "Meeting With an Old-Fashioned Mercantilist," "Science Takes Nothing on Faith," "Letters From Hungary," "Initiative From Outside".... I must stop here because I cannot list all of them.

Nobody was rolling their own cigarettes at that time; we smoked tailor-made cigarettes, and so we could not subject the journalistic commentary to the "Erenburg" test. But I know that Agranovskiy's essays were kept, and files with excerpts are kept even now, especially by those who have acquired the books that were published later. Amazing books! Having gathered together everything that appeared in the newspapers in the past, they are not covered with the patina of the "newspaper" but have assumed the quality of literature. Written for the hot press, possibly corrected on the run, the minute it was originated it was destined for a long life.

"We appointed a cat to catch mice. But on the distribution chart they brought in a tiger. A cat catches mice. He copes with his task. But people are not satisfied with him. He is not drawn to tigers!..."; "A newcomer who has just found himself in such a quiet office would feel like a live black fox in a fur

store"--these are from the newspaper and from the book. Whatever you say, Agranovski was an artist of the word. But his phenomenal success as a commentator is not explained simply by his artistic ability. Why, for example, is the writer's glory associated with socioeconomic problems? After all, he also wrote excellently about flyers! And also about designers, physicians and scientists. Why? I shall try to answer these questions somewhat later, but for the time being I shall note that he would be a good writer even if he had not squabbled with the militant bald man from Gorkiy, where he defended the honor of his late insulted friend, Oleg Nikolayevich Pisarzhevskiy, and even if he had not had a duel with the bureaucrat who was inflated with self-esteem--the "primitive mercantilist" with all of that nervous activity which was unprofitable from the standpoint of economizing on talent and writing labor, which was related to exposing fools who appear to be intelligent people, and installing intelligent people who for some reason are called fools, the cleaning of the Aegean stables, and the illumination of dark alleys of economic logic.

"What do you know about chromosomes?" I asked.

"We have no use for them."

"Have you read about them?"

"Why?" he said. "It is a dead issue. These chromosomes will not produce anything for animal husbandry."

"Well, all right," I said. "Just answer one thing: Do they exist in nature or not?"

"The head zootechnician has not said anything about that...."

..."He sits in his office and looks at me with cheerfully concealed hostility. The doors squeak, people come in, he speaks with them, he looks over papers and again raises his busy eyes to me. He said that he cannot show me the figures and that in general for conversation with the representative of the press he needs the permission of the higher management."

"But I need the figures," I said.

"Why do you need them?"

"I want to understand the principles of your work."

"I have no principles!" he said quickly.

Here was a long pause.

"What do you use as a guide in your work?"

"Instructions...."

..."Comrade Yanin, the deputy chief of Bratskgesstroy, confirmed that yes, there is timber, piled up, cross-cut, it lies along the entire route. He said that the builders will not ship it: it is not advantageous for them, that this is too small for such a large construction project. 'Then give it to us!' begged the petitioners. 'For all the kolkhozes in our Ust-Labinskiy Rayon.' But Comrade Yanin was kind enough to explain that there would be no point in this for the construction site. Not to mention the fact that it would be illegal. But the main thing is that they have nothing to do with it. Gigantic tasks are being carried out on the scale of the entire country, a new GES is being constructed, cities are being constructed in the taiga, as are plants the likes of which the world has never known. One cannot look at one's own little village, it is necessary to take a statewide view.

"But the timber is rotting," the petitioners reminded him.

"So what," said Comrade Yanin, "you will simply burn it."

"But is it necessary to have this kind of logic? Perhaps something has slipped by?..."

Struck by the discouraging absurdity, the great significance which here and there covered up the most ordinary bungling, he again and again burst into offices, cities and construction sites and wanted to dig up everything, to think it through and to argue it through. His documentary prose would have been ranked as literature--I say once again--even without this, but then there would not have been a commentator who defined the "high striving of thought."

No, I am convinced that it was not only the artistic nature of the words that captured the readers' hearts. We are faced with a social phenomenon. Like Valentin Ovechkin during the 1950's, Anatoliy Agranovskiyy during the 1960's burst through to the readers--on a new circuit and with a different, "urban" theme--through the curtain of "unread commentary" in which simple mortals had no faith. He broke through with essays that were intended for contemplation, which won people over with the truth and the charm of the "ordinary" human language.

He spoke candidly and simply about many things which at the time were considered to be "unpublishable." About the fact that there was no point in waiting for instructions regarding every insignificant thing; the time had come to think and to act with purpose and according to conscience. He began to write about the level of management directly, so that, as Peter the First said at one time, all stupidity would be evident. Such subjects had already been discussed openly, but so far only among "friends. But to raise such a ruckus in the press? To write about everything you think?...

People talked, judged and guessed--was he bolder than others, this Agranovskiyy, was he able to get away with more? They were angry, they rejoiced and they argued. And he himself loved to argue that he was carrying on a polemic with heroes and readers, open or presumed opponents. It was from these that his squabbles drew their inspiration. They flooded the newspapers with letters and the officials--with complaints, approval, protests, and

petitions of support. They cut them out and stored them. They thought and began to see clearly.

Herein lies the essence of Agranovskiy. In this!

In the articles that appeared immediately after his death they emphasized: "Everyone knew him." This was not the point. Many people are known--writers, journalists, scientists, actors, sportsmen.... No, they did not simply "know" him; they believed him. They believed not his editor and not his newspaper (I do not wish to say anything bad about them; I only wish to register a phenomenon of readers' psychology), but precisely him, Anatoliy Agranovskiy. Personally. This is a special kind of distinction.

Let us not forget that at that time, during the 1960's, a responsible worker of the experimental base of the USSR Academy of Sciences could still, in a letter to the editorial staff, designate a writer to be a "hack": "Who gave you, you hacks, the right to call the August session of VASKhNIL (1948) the beginning of an administrative rout of genetics?!" Let us not forget that even with Agranovskiy, a popular commentator with not only a press card in his pocket but also a certificate showing that he was a correspondent of a central newspaper, a highly placed bureaucrat could allow himself the condescension: "I have a lot of questions for this busy person, but he gets up, indicating that the conversation is ended, and I leave. But the questions remain." Incidentally, it was Agranovskiy, if I am not mistaken, who was the first to write about the intolerable attitude of officials toward the press. They used to get away with this, but now they begin to understand that they would not be able to. This is an excellent example of the self-respect of the journalist and the newspaper. It is a pity that we do not always follow this example now.

But then....

I recall those times....

When I finished school I got rid of my last uniform shirt, but the editor of the Solnechnogorskiy Rayon newspaper, PUTILICHA, Mikhail Fedorovich Belikov, when hiring me, said: "You should not have taken it off, put it back on. The country is no place to wear a tie." I slept on the editorial desk because I did not have my own corner, I walked long miles through the villages--we did not even have a bicycle--and I witnessed some impressive scenes. I recall that a subscription for a public loan was being circulated. A red-haired peasant with a shabby appearance was stubborn and refused to purchase a bond. The authority from the rayon in my presence leaped up to disgrace him: "Hey you, you are not bearing a cross!" But the peasant suddenly poked his hand inside his shirt and, turning his back, bent over, showing the multicolored patches on his rear end: "I have a cross--but I have no trousers!"

The kolkhoz peasants were still being forced to work, and at the plants the main indicator was the "gross output." But Ovechkin's time had passed, and the time was coming for the almost unknown Agranovskiy, the author of essays about archaeologists, astronomers, linguists--exceptional people who had made amazing discoveries--and also stories about test pilots. His voice was just

about to be heard, although he himself was still just looking around at the changes taking place and listening to his own voice.

"We shall move from highly artistic comparisons to everyday life"--this is the ironic Agranovskiy wedging his way into vital conversations. This is he, having understood himself and something essential in his surrounding reality, who bursts from the morning newspaper into our home, into our heart: "Comrades, we must sweep off our sidewalks."

But how do we "sweep" them?

Perhaps it is all a matter of people? "Personnel are the key to everything." Should we drive out the ungifted ones and promote the most intelligent and best directors to positions to manage the rayons? Agranovskiy answered:

"First I shall tell you about a poor rayispolkom chairman. Then--about a good sovkhos director. The chairman was 'tossed' from one rayon to another, but he could still not make the grade.... He was criticized and criticized, and finally he was fired. Incidentally, the director about whom we are speaking was in good graces from the very beginning. They were constantly praising him and using him as an example for other directors because he was simply an experienced and knowledgeable manager. Now is the time to tell you that we are speaking about one and the same person.... I would certainly not look for the reasons for this magical transformation in the area of psychology."

The discussion is crucial for our day as well: "What is a...products list?" Perhaps there are not enough intelligence specialists? Practical workers are being suffocated? The system of education should be expanded, more capable children should become engineers? Agranovskiy answered:

"It has reached the point where today at a plant--on the Vyborg side!--it is easier to find a designer than a lathe operator of the sixth category.... Through many years of persuasion we got our way, as they say: almost all school graduates are running to the institutes. There are five applicants for one position, eight, 10! The professors are overjoyed: they have the opportunity to select. And they do select--one out of 15 or out of 25. And the rest of them?.... I assume that they enter on one of the paths to indifference, distrust, drunkenness, crime and finally.... Where did they get a hold of us and why is this drive for diplomas still going?"

Perhaps forces should be concentrated on the most important sections of the leading edge? Agranovskiy answered:

"But industry has no 'rear edge.' They can accomplish miracles of labor heroism and the building of a new plant will appear in the taiga on time, but later, because of untalented work in some quiet rear guard office the entire attack dies out." (Concerning the still-unsolved mystery of supply, the activity in which "on the one side there is complete impunity" and on the other--"a complete lack of interest.")

Perhaps we should begin by putting a stop to wastefulness? Impose the strictest regimen of economy? Agranovskiy answered:

"But many problems are caused by this 'thriftiness.' Here I notice a shadow of suspicion flicker in the eyes of my opponent: that is just it! It turns out that the author is against economizing. But does this author know what immense tasks are facing us? Is he aware? Yes, the author is aware. The author is unequivocally in favor of economy and against extravagance.... But let us imagine, as D. I. Pisarev said, that our lofty feelings do not fog up our penetrating minds. What is better, what in the final analysis is more advantageous: to pay wages for an average of 200 experienced chemists or to take 2 years to assimilate an immense plant?"

I shall explain: a commentator was confused about why the salary of chemists was a category lower during startup--after all, this caused the departure of personnel, delay in startup work--and they answered him: this is what the instructions say, for during the period of startup there are no products and no plan. Agranovskiy: "But let us put the instructions aside and pose the question directly and crudely: Why is this being done? What is gained here, as it were, by the workers of the Ministry of Finance and the Committee for Questions of Labor and Wages?"¹.

Is it not true that even the very dates of the excerpts cited here are eloquent: 1961-1964? The threshold of the changes that appeared in 1965. It was later that we were blessed with the economic reform which, after a wave of hope, brought about the froth of bitter skepticism. It is now, when we have gradually become more enlightened and more intelligent, that we have become capable of critically and constructively perceiving the meaning of today's large-scale experiments in the economy, which is filled with the research of science and practice of the 1980's.

Agranovskiy's lessons help us to understand better what is taking place and what will have to be done tomorrow.

Now we are speaking and writing about intensification. The word is in the air and has become familiar. And it already seems to some people that it is another noisy campaign, it will die out, like corn.... It will not die out!

Either--or. The country's economy is faced with an alternative. Either we actually do change this gigantic economy over to the passive intensification, that is, we begin to produce many more products with a smaller quantity of all kinds of resources than we now use, including energy, raw material and personnel, or the growth of the state's economic potential and the standard of living of the Soviet people slows up. And so it turns out that there is no choice. Intensification is all that remains. Important party documents have been adopted regarding it. This is a program issue of modern economic policy. We are faced with a task which is equal to industrialization in its scope. Not everyone understands this. This is why we are moving slowly, lagging far behind what is intended. Here is where commentators must roll up their sleeves. Nobody wants to sit around and wait so long that we miss our target. To find and drag out in the open the new day primitive mercantilists--is the behest of Agranovskiy.

But it is time to figure out: Which road will lead more quickly to the goal?

Some people show that the main things are automated equipment, robots, and updating of technical equipment and technology. They convince us that it is necessary to improve the economic mechanism. To this they add that it is necessary to strengthen discipline and order with an iron hand.

There is no doubt that all this is important and necessary and it is being done. Experiments have been set up and we are awaiting the crop from the experimental field. But, recalling Agranovskiy's lessons, let me introduce a portion of skepticism in the understanding of the "obvious."

Scientific and technical progress, I agree, is the high road. But in and of itself it is not capable of halting the flywheel of inertia. Who will move progress "along this high road"? People--they are the only ones there are. And as progress takes place people's attitudes are complicated and confused. Frequently they oppose an innovation out of considerations that are far from the highest: it is disadvantageous, it is troublesome, the plan and the bonuses could be lost, while one is introducing one is also rearranging things. Or the idea has come from the outside and it is almost kicked out of the way. Or people have mixed something up or forgotten something. Let us recall this same Agranovskiy: "...In Voronezh at the synthetic rubber plant extremely valuable imported polymerizers have been lying around for 2 years now. Why? The suppliers have not delivered the pumps."

To these observations of a commentator of 20 years ago I wish to add my own impressions. When I was on the Kama I saw an immense imported machine for coating paper, which had been broken down into spare parts for old equipment which was incapable of coating. The paste had not been delivered--this was the justification. "I cannot even stand to hear about this paste!" the minister told me. "So many years the associates have been promising it, but we still do not have it." And the basis of the paste is ordinary white clay.

And the leather workers were not stingy with foreign currency and bought an entire plant, a miracle of progress. For several years the miracle lay around in an open field near Barnaul and then, without even unpacking the boxes, they began to send the plant in pieces to various enterprises. And they had their own justification: they contemplated construction, but then changed their mind. Of course all this is taking place, as Anatoliy Agranovskiy's hero "Comrade Yanin" explains to us, exclusively in the interests of "carrying out the gigantic tasks on the scale of the entire country."

The ordeals with innovations in domestic production have been discussed repeatedly. The heart-rending inventors' cry, "Introduce!", which one can hear from all over, sounds like "Help!"--a sign of disaster.

Scientific and technical progress is like an automobile on an unrepaired country road in autumn: it must be pushed a great deal before it will carry us.

Something similar can be said about the restructuring of the economic mechanism as it is frequently understood: the replacement of certain indicators with others. There have been plenty of partial, half-hearted

restructurings. Now something else is necessary. If the pumps do not pump water into a building, you can replace the white tile in the bathroom with blue tile or you can install a sparkling nickel Yugoslavian sink--but you still will not be able to take a bath.

It is necessary to move away from particulars and think about concepts.

I read what Anatoliy Agranovski said as early as 1963:

"The appearance of activity is 100 times worse than simple 'honest' inactivity.... It corrupts people morally or, in the words of one old forge operator, it 'fouls them up.' This is putting it strongly. But in 1973 when I published an article in LITERATURNAYA GAZETA titled 'Simulation of Activity' there were no fewer examples of 'fouling up.' And there are just as many to this day. In an essay titled 'Durability' (1983) I discussed Kishinev, where there was a meeting, an orchestra, reporters, a special edition of the local newspaper with victorious reports about the startup of a new shop. And all this turned out to be ordinary 'fouling up': the shop was not completely constructed, it was not operating, and for the sake of appearances they cast an 'experimental model' on the outside...."

How can this appearance of activity continue for so long? All this is a result of what I myself call the 'concept of technological thinking.' It recognizes only one word: more. More money, metal, people, machines, construction projects, fertilizers.... This concept has prevailed for decades. It gives rise to expenditures of many billions of rubles, the return from which does not correspond to the investments.

We are investing more and more money but frequently the equipment is withdrawn from circulation, it is damaged, and raw and processed materials are scattered or broken down into wastes. We observe all this with alarm and sometimes with confusion. Is this where the mismanagement comes from? The answer is in the word itself. We should not be thrown off the track by the change of a letter. "Mismanagement" means that there is no manager. Let us remember this!

As distinct from "technological" thinking the "concept of social thinking," as I understand it, suggests relying mainly not on increased resources and investments, but on man's interest in the results of his labor. Someone who does not care must be transformed into a master. Someone who is indifferent must be transformed into an active person who is zealously concerned about multiplying his (and thus collective, public and state) income. It must be advantageous for the worker to try with all his might, to do better and more, to save, not to squander and not to ruin. It must be advantageous to him himself! Such is the task.

A motivated person with a hoe and shovel can do more than an indifferent one with a tractor and a bulldozer. The latter sleeps under the wheels waiting for someone to bring him a bolt that needs to be replaced. But how does one put an end to indifference? Where does this lack of motivation come from if everyone is working for himself and if all of us are property owners on the statewide scale?

But let us think about this: Is this clear theoretical thesis not too abstract for many of us? Does everyone actually perceive himself as a nationwide property owner, a co-owner of the country? When asserting this, stressing awareness, are we not exaggerating the real level? Are we not replacing what really is true with what we wish to be true?

A person knows that his personnel department and manager "hire" him. The rates, norms, tariffs, salaries and indicators--are all established without him, from above. Instructions also come from above and sometimes people do not even pay very much attention to him. Such a worker does not actually feel that he is a master and he acts accordingly.

You squeeze out some overtime for me, which is illegal, and I will give some private builders a brick machine, which is also illegal, and I can also pour some gas into your private Zhiguli. You pay me by stretching things, and I respond by giving you light bulbs. Do not take me too literally: I know that this is not true everywhere. Naturally, there are more conscientious, honest workers. But when a weaver fulfills two annual norms by producing unmarketable fabric which lies around in the warehouses, is this acting like she is an owner? And we are speaking about an advanced production worker!

No, a master is something altogether different. Read over the essay by Anatoliy Agranovskiy titled "Masters" which was written in 1971. It is about the Zlobin contract. Now we know a lot of different things about this. We can even see formalism in the dissemination of this valuable idea. But Agranovskiy caught the essence of it precisely:

"The contract is nothing new, and it can be applied under different social conditions. Here too the time period is stipulated and the cost of the work is also determined beforehand, but the client is the state and the means of production are in the hands of the state, and the work has been taken on not by a skinflint contractor who will squeeze his profit out of his workers, but the workers themselves have taken it on.... This is wise and completely in keeping with Marx. I have seen their labor: money alone could not make them so zealous if their hearts were not in it. I understood: moral incentives... primarily in labor, in its manner and its meaning. In money itself, if it is earned honorably, there is a moral stimulus: this is what I am worth and so the society values my labor as much as that of other people. And consciousness begins, competitive motives appear, and there is discipline, order and concern not only for one's own immediate workers, but also for future general work; much can be generated from this concern. From actions come customs, from customs--character, and from character--destiny. Nothing is born of indifference."

How correct that is: money alone will not make labor zealous! I add that the matter cannot be reduced to the self-respect of a man who has honorably earned money through his labor. The master is attracted by the situation itself which allows no ambiguous interpretations. This means only one thing: the right to manage. To decide, to dispose of and to distribute work and income. So far we have only the beginnings of this.

The occupational training of the future socialist manager lies in the Zlobin contract, noncontract agricultural teams, and the Kaluga variant of workers' self-management at the turbine plant. Some managers grab onto such ideas and then lose interest in them. As soon as a true sense of ownership appears they immediately place serious demands on the managers themselves--moral and professional. One cannot wave off the demands of the contract collective. It is testing for durability the widely proclaimed statements of certain bosses concerning their confidence and respect for the worker, their devotion to the ideals of production democratism.

When the general director gives up his desk to the council of brigade leaders and patiently listens to what is said and decided by the lathe operator Chernov or the smelter Borisov and their comrades, as I have seen in Kaluga and Penza--that is one thing. But when the manager places his ambitions above the business and makes the obstinate contract team disband, as happened with the team of Valentin Popkov in Moscow Oblast--that is something altogether different.

There is nothing more just than the position of a person who wishes to think, decide and manage along with the managers, sharing their responsibility. It is difficult to manage thinking people, but there are none who do not think, we all have ideas although, to be sure, we do not all express our demands out loud. Many people remain silent and assent without knowing that they are being guided by the rule which Herzen observed in Russian reality: "...Think however you want to, but lie as others do." And people become alienated from labor because they think that it is not their own affair. Is this not the source of the erosion of morality in the sphere of labor? Is this not the source of the lack of conscientiousness, slipshod work, absenteeism and drunkenness?

Anatoliy Agranovskiy was extremely interested in the development of the "Zlobin subject." Regarding my book "The Kaluga Variant" he sent a short note in which he expressed ideas about the Kaluga workers: "Bold, efficient and very sensible." He wrote about the essence of the problem: "It engages me in a real sense." One can only imagine what shoots would have been produced from this grain of thought contained in the essay "Master."

I mentioned the despotic directors. And I must say that their situation is no better with respect to the departmental management. We will not see a full-fledged manager until we change over to truly complete cost-accounting [khozraschet]. The kind whereby not only an individual, and not only the brigade, but the collective of the entire enterprise becomes the manager. This means considerable expansion of the economic rights of the enterprise, which gives it the opportunity to come to an agreement about the assortment of products, the volume of their output and the prices. This actually means the elimination of the concept of "wage fund" which is established beforehand, even before the work begins, when there are not yet any products. It is possible that with the exception of what is due the state, the collective could dispose of everything else: what to leave for the development of production and how much to take from the remaining income for wages and incentives. We happily forget about developing the "ceiling of being a master" when a master appears.

Such ideas still perplex many people. But they are already out in the open. It is time to think and time to decide.

Agranovskiy was right: "Nothing is born of indifference."

As fate would have it, my small review of Anatoliy Agranovskiy's last book, also a small one which was printed in the magazine NOVYY MIR, turned out to be the last response he read about himself while he was alive. Therefore I am reproducing the text verbatim.

Anatoliy Agranovskiy, "Sovershenno ne sekretno" [Not At All Secret], Moscow, Sovetskaya Rossiya, 1983, 86 pp.

"When you want to hit a moving target you must fire with a lead"--having read this in Agranovskiy I recalled the artillery firing range during 1945 when I, a green young lieutenant, was entrusted to teach the theory of firing to "war gods" who had traveled the path from Stalingrad to Berlin and were old enough to be the fathers of our platoon leader. A tow truck with a long cable pulled the plywood mockups of "Tigers" and I raged that the gun layers would never be able to master the formula for lead fire. I decided to show them myself, but confusion broke out: I fired twice and then threw up my hands in despair. Then a sergeant came up to the weapon and slowly began to turn the handle on the lifting and turning mechanism. He fired and the "tank" was blown to smithereens. He fired again and only pieces of it flew off! "We did not learn theories," said the sergeant, "we did it in the old countrified way...."

Since that time I remember clearly: it is not enough to know the formula, it is also necessary to be able to fire with a lead. If one looks around at the fields of our economic battles--the area that engaged Anatoliy Agranovskiy most--it is not difficult to find in many cases that people had a fairly good knowledge of the rules but missed the mark distressingly. They constructed a plant and forgot about housing, and personnel "slipped away." They celebrated the startup of an energy block, but the building for its station was not to be completed until 2 years later. A store is filled with goods, but they are not sold because the fashion has changed. The author is able to break through the shell of false well-being. But what is underneath it? After an incision with the writer's scalpel we see: thoughtlessness or idle chatter. A commentator finds the precise words: "You cannot get rid of mismanagement through disorder"... "A policy is not a parking place, but a schedule for movement. When it speeds up unquestioning adherence to what was once established this causes no less confusion than a thoughtless passion for changes"; "The organism should operate not of its own accord and not as though it has swallowed a piece of something and is waiting for a signal from the esophagus: 'Push!' Then a command from above: 'Begin to release the gastric juices!' and a bell from below: 'The bile was not delivered!...'"

The quick-witted will say that this is clearly a book about petty bureaucrats, bunglers and fools. You are mistaken!! "I intend to write mainly about the good people. But even in praise there is comparison. If they have impressed me this means that not everyone works this way." The writer sympathizes with those who are building new roads in the development of domestic economy,

people who are engrossed and fearless and who reputedly suffer for their fearlessness. His heroes are those who live "according to the law of the bicycle: As long as you are going you are upright, and when you have stopped you have fallen." Workers, specialists and managers--with all the differences in their characters and destinies, at some point they are similar to one another. They are similar, for instance, in that they have original personalities--the engineer Kostyukov, the author of the "insane" idea of assembly with red-hot ingots: he sat under this terrible load until the assembly was completed. Under the conditions of reconstruction a risk justified by calculations turned out to be the best way of gaining time. In his gallery of portraits the commentator introduces a common denominator: these people are not temporary favorites, they are not slaves of circumstance, but they are creators.

And again it is clear to the quick-witted: it is a declaration of value, the author is calling on people to imitate his heroes, to mold their lives from the models. And again--this is a mistake, this is not the case! Agranovskiy says: "I would be a dishonorable person if I were to call upon the readers now to follow this example." He respects people of action, but not everybody is capable of penetrating through the jungles of bureaucratic paragraph, conservative management traditions, departmental ambition, indifference, misunderstanding and suspicion. It was already said long ago: initiative is punishable. From the private lives of his heroes the author derives generally significant problems. Why do people who are concerned about the general good frequently find themselves in the worst conditions? Where does the mania for prohibition, the "desire to hide that which is not pleasing," come from and where does it go? "This, honestly, is what bothers me more than anything else."

Agranovskiy's book is about exceptional people who have ended up in the grip of an outdated economic mechanism which they cannot resist simply because they are exceptional. And there should be no need for resistance, the mechanism itself should take the initiative. The example of those who are in the vanguard shows the need to change the conditions for all who follow them. About all this--"not at all secret"--information Agranovskiy spoke with a candor which requires civic courage from the author and his heroes.

I have been convinced time and again: Anatoliy Agranovskiy is able to fire with a lead. "It is good to be the first"--these are words from his program book "But the Forest Grows." During the 1960's the writer-commentator was the first to draw society's attention to the position of the "sergeants of industry" (since that time the expression has become common), to how much it costs to "waste education" (this has also become a common part of the language) and the danger of "primitive mercantilism." Later he familiarized us with many people whose names are now known throughout the country. Then, without betraying himself, he was the first to talk seriously about reconstruction: "We cannot endlessly build the new. Regardless of how great the power may be, there is a limit, and there is no other land to count on in the future. Regardless of how great the nation, it has been calculated (reconstruction--this is the only word which to the detriment of style I will have to keep repeating all the time."

Personally I do not find that this is to the detriment of style. The new book is attractively and precisely written, it is populated with memorable people and it is rich in aphorisms and worthy "wise thoughts." Colleague commentators are familiar with the words of Anatoliy Agranovskiy, which have come to be widely used in the professional environment: in our day a good writer is not one who writes well, but one who thinks well. So forgive the master a certain craftiness here. He himself, of course, writes just as well as he thinks: he has mastered the plot, he is exacting about his phrases, and he has a taste for details. But the game of the mind is still the main thing for him.

What is a book? There is the humorous "criterion": "If it stands on its end it is a book; if it falls over it is a brochure." As distinct from Agranovskiy's thick books ("But the Forest Grows," "Details and the Main Thing," "A Master of His Trade") the new work was intended to be small from the very beginning: this is a requirement of the series "Writer and Time." On the spine is written "Not At All Secret." Still it is a book! On its 86 pages the author has provided a charming discussion of good people and along with them he has given that battle to the self-satisfied liars.

NOVYY MIR, No 1, 1984

The January issue of the magazine came out a little bit late. Anatoliy Abramovich apparently received it at the beginning of February. And a couple of days later, on 10 February, a letter came from him.

"I am truly touched by your article," wrote Agranovskiy. "Not because you praise it--in my self-esteem I expected that. I am touched by your extremely complete understanding, right down to the fine points, the smallest facets. I am touched by the fact that a person who is writing this is an ally who knows the matter from inside, who has mined the same vein...."

In and of itself this fact could be read as only an act of politeness were it not for two circumstances.

Agranovskiy did not like social ceremony, he was harsh in his evaluations and judgments, and he was exacting of his acquaintances. He maintained a permanent and fairly narrow circle of friends. He wrote letters without thinking about official responses to the editorial mail, rarely and briefly, with a pen and not a typewriter, and without copies for the archives. This is one thing. The other has to do with our relations, which were certainly not close.

There have been three or four phone calls during the long years of our acquaintance, mostly on business. We have had several brief meetings in editorial offices, the publishing house and the Central House of Writers. And the only informal conversation we ever had, over tea, was in his office on Lomonosovskiy Prospekt. We exchanged news about publishing--what was happening in IZVESTIYA, and how were things in LITERATURNAYA GAZETA? Agranovskiy's memories of LITERATURNAYA GAZETA, where he had once worked, were dear to him. We discussed common acquaintances, joked and laughed. But at that time his humor was morose.

Of course he had as many jobs as he wanted; editors of magazines, publishing houses and movie studios were after him. Commentators he knew who had hardly gotten on their feet left the newspaper without regret, essentially without any reason. But he, who was well-known and had published many books, was depressed unless he had something appearing in a newspaper. One could see in this something of Mikhail Koltsov, whose successor he was in Soviet journalism. (Koltsov has a book titled "The Writer in the Newspaper," and there he jokingly complains that the editorial duties took up all his time--there was no time to write, no time to eat, there was no end of phone calls, visitors, speeches, mail--hundreds of letters a day, and it is necessary to stay up until midnight. In a word, a terrifying situation in which it seems to him himself that he is like a trolley "packed with passengers like sardines, weighted down with people on the running boards and bumpers, wildly yelling to the passersby and missing the stops." And this ends with the admission: "But still to work like this with a densely busy day filled with concerns, not as a writer would ordinarily work--brings immense satisfaction.")

In February 1984 when Anatoliy Abramovich Agranovskiy wrote me that letter his newspaper life again reminded one, to return to Koltsov's metaphor, of a "trolley." And he was boundlessly glad of this. Not a trace remained of his mood in the 1960's. There was a different editor, and there was a demand for Agranovskiy's work. And there awakened in this newspaper writer the passion of a warhorse who has heard the battle cry, something which had essentially never died in him. He was bursting with ideas and subjects. And time, which had come full turn, demanded a "tete-a-tete" conversation with all of society. It demanded the trustworthy commentary of Agranovskiy. Like then, during those years...were it not for the Accursed One with his scythe...

We had our last telephone conversation--he had only a couple of days left.... Who would have thought that? Anatoliy Abramovich was lively and active. He discussed the details of his work on the essay titled "Reducing the Staff." He had impressive facts and figures. His mind had generated ideas and, for some reason, doubts. It seemed to me from his words that everything had been collected, he had written a good deal, and all he had to do was sit down and complete it. But he sighed: "How will it come out, how will they receive it, will this pass?"

With interest and compassion he tried to find out the details about the article I was preparing at that time regarding overtime, disregard for labor laws and "black" Saturdays and Sundays. "Very, very necessary," he said, "put everything else aside and finish it. But it will not be easy for you, I know. It is a painful subject."

My "Work After Work" was printed in LITERATURNAYA GAZETA on 6 June 1984. Alas, it turned out that this was too late for Agranovskiy. He was destined not to read it.

And I read Anatoliy Abramovich's article "Reduction of Staff" in IZVESTIYA where it was published posthumously, along with a rare note--pages from the journalist's notebook. Good boys, you people at IZVESTIYA! I thought about

the fact that this had never happened at LITERATURNAYA GAZETA, where we have lost so many talented friends.

In the uncompleted sketch of the essay and in the aphoristic notes from his notebook which were directed toward the heart of the problem I again saw the first commentator of my youth.

A teacher. A master.

We all learned from him. He left his pen for those who wish it, and departed unsurpassed. Now anyone who wishes to be a modern commentator, regardless of the generation to which he belongs, must remember Agranovskiy's credo, his behest, his open lesson in the school of mastery which the author unpretentiously called "Introduction."

An introduction to the book "A Master of His Trade"? Yes, but that is not all.

An introduction to the complicated and unsteady world of creative cooperation between writer and society. An introduction to the holy of holies of artistic commentary, where you appear, in the words of my friend the metalworker A. G. Solipatrov, always with an open safe, protected by nothing, without a mask or a visor. Everyone wants to read your soul and judge it as he will. They believe you or do not believe you not according to your duties, not according to your position, not out of fear and not out of servility. You are one on one with people who pay attention to you or people who turn away from you with indifference.

So what should you say to them? How should you write? About what? Agranovskiy answers:

"Social commentary is called upon to awaken social thought. When a writer sitting at his desk looks for a new slant on the subject, a new plot, new words, all this is done in order to lead the reader to thought. And if the commentary is monotonous, if a repetition of what has already been said is presented as a new statement of the problem, society's thought will not be awakened and not be sparked. This kind of writing is sometimes called useless. I cannot agree with this. What is useless is harmful.

"It is garbage when they say that there are 'simple' people who cannot say anything worth while. There are no such people. And if we find such people that means simply that we are very boring conversationalists, that we have raised empty issues and that we have not been able to listen to the argument and understand the individual.

"The core of commentary is the author's conviction. Ideological conviction. The best statements are originated when the writer could exclaim: 'I cannot be silent!' The worst ones are when he can say 'I can be silent.' I believe an author if I feel that he is disturbed by what he is writing about. I understood long ago: one can allow oneself any degree of criticism if the reader sees that the writer is vitally involved in the matter.

"In essence I have presented the principles of Soviet party commentary, in which I believe and in which I have tried to follow...."

The book "A Master of His Trade" from which these lines of Anatoliy Agranovskiy's creative work are taken, discusses the mastery of various people. But first of all it tells us about the author himself--of his own and of our common cause--the Master.

Books by A. A. Agranovskiy:

"A les rastet" [But the Forest Grows], Moscow, "Sovetskiy Pisatel", 1974, 639 pp.

"Svoyego dela master" [A Master of His Trade], Moscow, Politizdat, 1980, 416 pp.

"Detali i glavnoye" [Details and the Main Thing], Moscow, "Sovetskiy Pisatel", 1982, 593 pp.

"Sovershenno ne sekretno" [Not At All Secret], Moscow, "Sovetskaya Rossiya", 1983, 86 pp.

FOOTNOTE

1. Now the State Committee for Labor and Social Problems.

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PROGRESS IN AUTOMATION DESCRIBED

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[Article by V. L. Lukyanov, candidate of economic sciences, Moscow Hydromelioration Institute: "A New Stage in Automation"]

[Text] The essence of automation can be reduced to a gradual transfer of the control of production, auxiliary and service operations from man to machine, as a result of which production requires man's direct participation to an ever lesser degree.

Automation has developed in several stages. Each of them has involved transferring to technical equipment various control functions and the introduction of certain automated equipment: in continuous production-- measurement and control-regulation instruments, and remote control panels; in mass flow-line production--semi-automated and cyclical automated machines, and semi-automated machine tool lines; in unit and small-series production--equipment with program control instead of universal machine tools.

In the second half of the 1970's there began a principally new stage in automation, which is characterized by the creation and rapid dissemination of microelectronic equipment and flexible productions. This stage, which is called in the West the microprocessor or microelectronic revolution, creates conditions for changing over (on a qualitatively better technical base) from mass- to large-series, series and small-series production.

In the opinion of many scientists, microelectronics is the most important achievement of the scientific and technical revolution during the last third of the 20th century.

Features and Segments of the New Stage

Microprocessors and microcomputers which are based on them are inexpensive (and their cost is constantly dropping), they are small and they are relatively easy to program to perform the most varied functions. During 1973-1981 the cost of a typical microprocessor dropped to less than one-600th of the original amount, and the capacity and speed of operation increased 32-fold and 200-fold, respectively. These qualities make it possible to successfully

replace computers of medium and small capacities with microprocessors and microcomputers, and to build them in and hook them up to any equipment for production and nonproduction purposes. Even at the end of the 1970's the cost of a unit of capacity of a typical microprocessor was one-tenth that of a minicomputer and one-100th that of a computer with average capacity for that time.

The first microprocessor was created by the Intel firm at the end of 1971 and more than 1 million microcomputers were in use in capitalist countries by 1981. The largest sphere of application of the microelectronic equipment in them is the processing industry, where this equipment is used for automation of production and engineering-technical, scientific research and design work. Thus in 1981 in U.S. industry more than 500,000 microprocessors were used for these purposes, and in the FRG--more than 75,000.

The changeover of industry to extensive application of microelectronics is largely conditioned by the increased economic and technical requirements placed on modern production. The increased competition under the conditions of the crises in the economies of developed capitalist countries which became worse starting in the middle of the 1970's¹ creates a persistent need for increasing labor productivity and reducing labor expenditures while simultaneously sharply increasing the flexibility of production (the ability to rapidly develop and produce various kinds of products in keeping with the individual demands of the consumers). The traditional kinds of automated equipment (for instance, automated machine tool lines), as a rule, reduce outlays for producing the products as a result of decreased flexibility--reducing the assortment and products list. The increased intensiveness of production processes and the application of principally new technologies for processing also contribute to the rapid dissemination of microelectronics in industry.

An important role is played by the successful struggle of the working class of developed capitalist countries. By achieving from the entrepreneurs a higher wage level, improved conditions and safety for labor, the workers are making it more and more advantageous to utilize microelectronic equipment. In Japan, for example, one of the main factors which brought about the active introduction of microelectronics in industry during the 1970's was the relatively more rapid increase in the nominal wages as compared to the prices of microelectronic equipment. From 1973 through 1980 it increased (the result of increased prices for apartments, food and so forth) while the prices for microelectronic equipment decreased significantly.

In the United States entrepreneurs are trying to introduce it into foundry work, particularly in order to reduce expenditures on safety equipment. In 1971 this country's congress adopted the law on safety equipment in production which established the requirements for this. According to the estimates of American experts, the utilization of microelectronic equipment and robots for control and servicing of the casting machine alone reduces expenditures on equipment providing for technical safety by an average of \$20,000. The shortage of highly skilled workers is also not insignificant in the accelerated introduction of the latest automated equipment.

The sphere of application of microelectronic equipment is spreading from directly production processes to engineering-technical, scientific research and design work. This is related, in particular, to the relatively poor capital-availability and low labor productivity of workers in these spheres while their wages are significant. For example, in the United States at the end of the 1970's the cost of equipment for one design worker amounted to approximately \$2,000. At the same time the analogous indicator for an industrial worker exceeded \$40,000. In 1978 the cost of installed design equipment and expenditures on processing data in the United States amounted to \$73 billion, and the wages of design workers amounted to \$373 billion.

Because of microelectronics labor productivity has increased from threefold to 30-fold. Automation of planning makes it possible to reduce, for example, the time for the development of a new model of automobile and the equipment necessary for its production by an average of 2-3 years. The basic equipment in microelectronics increases labor productivity in design work twofold and when developing production plans, 15-33-fold. There is a considerable savings of raw material, energy and processed materials. The utilization of microelectronic equipment, for example, for control of the process of boiling paper pulp reduces the expenditure of electric energy by an average of 37 percent, and gas--by 18 percent.

It is expected that in the near future the application of microelectronic equipment for automating production and nonproduction processes will increase sharply. According to the estimate of American specialists, expenditures on the acquisition of microelectronic equipment for automating production in the processing industry of the United States will reach \$4.8 billion by 1985 (in 1980 it amounted to \$1.1 billion) and there will be about 13 million microcomputers in operation for control.

Robots based on microelectronics are being introduced more and more extensively into production. One robot replaces an average of two to three people, and the time for recouping the cost of this equipment, as a rule, does not exceed 2-2.5 years. The majority of robots are used in the automotive, electrical equipment and machine-building industries for servicing welding, painting, casting and assembly work. There is no doubt that the most promising sphere of application of this kind of equipment includes assembly operations, since now more than 40 percent of the people employed in industry in capitalist countries work in assembly lines. The first line on which robots performed all of the assembly operations was introduced by the Swedish firm Electrolux in 1973 at a refrigerator plant. But up until recently, because of the cost and the imperfection of series-produced robots, less than 5 percent of this equipment is used for assembly work in capitalist production. At the present time many Japanese, American and West European countries are completing a changeover to mass production of robots which were especially intended for assembly operations. With their help in the industry of Japan and the United States by 1990 from 10 to 20 percent of the assembly work may be automated.

Microelectronic equipment and equipment that is based on it create good prospects for automation not only of individual production and nonproduction processes, but also of sections, shops and divisions of enterprises and

organizations. Microprocessors and microcomputers that control individual processes and units of equipment can be joined together with each other and with many computers which control the shops, sections and divisions. As a result, there are complexes or blocks of equipment that are controlled by systems of hierarchically interconnected computers. In each one of these blocks one achieves comprehensive (or close to it) automation of a particular totality of production and nonproduction processes. For example, in the processing industry the basis for comprehensive automation of production processes are flexible production systems--complexes that are controlled by hierarchically interconnected computers, multioperational machine tools with numerical program control and robots that are joined together by programs devices for moving raw materials, blanks, semimanufactured products and prepared products. The application of automated blocks sharply increases labor productivity. Thus 12 workers of the Japanese firm Yamajaki Machinery Works, using flexible production systems, now produce in 3 days as many parts for machine tools with numerical program control as used to be produced by 215 workers in 3 months.

Another merit of the complexes under consideration is their flexibility, that is, their capability of producing with minimum outlays various kinds of products in small series. For example, the General Electric Company, when it introduced a flexible production system (GPS) at one of its enterprises, arranged for flow-line production of more than 2,000 various electric meters.

A GPS can easily be reprogrammed to produce different products and therefore it takes the place of several traditional automated machine tool lines and saves considerable amounts of capital investments. The plant of the Japanese company Fujitsu Fanuk, at which robots and machine tools with numerical program control are manufactured with the help of GPS's, costs approximately one-tenth the amount of those produced by an enterprise of the same capacity which utilizes traditional equipment.

The scale of application of the GPS is insignificant so far. Thus in 1982 Japan was using approximately 50 systems, the United States--30, and Western Europe--11. This technical equipment is being introduced mainly by enterprises that produce machine tools which numerical program control, robots and electrical equipment products for aircraft. During the 1980's there should be an essential expansion of the application of GPS's. Even by 1990 the volume of their sales will reach (according to estimates) \$30 billion in capitalist countries. The consumers of the GPS's will be branches with not only single-unit and small-series production, but also those with mass flow-line production. The Japanese firm Toyota was the first among the large automotive companies to introduce the GPS. The sharper competition on the world markets and the growing diversity of the consumer demand are forcing the company to update its models of automobiles rapidly, taking into account the individual demands of the consumers. As a result, at its plants are increasing numbers of production lines, on each of which they manufacture no less than 1,000 various models. It is precisely these kinds of lines that the firm is replacing with flexible production systems. In the opinion of specialists from Toyota, the utilization of GPS's is also economically advantageous for manufacturing spare parts: this is stimulated by the expansion of the products list. With the increase in the production of motor

vehicles with front-wheel drive, the demand for parts for assembling them is more than doubling. Intentions to introduce GPS's were also announced by firms of the shipbuilding, electronics, textile and wood-processing industries of various capitalist countries.

The joining together of computers that control individual automated blocks with one another and with the central computer of the enterprise makes it possible to create a unified integrated system for comprehensive automation. This automates control, development and planning of products, calendar planning, production processes, quality control, dispatch of the products to the clients and so forth. Such systems first appeared in branches with continuous production processes where the very nature of the production facilitated their creation. In 1975 at a chemical plant of the Dupont company in Texas they introduced for the first time a system of interconnected computers which was fully responsible for control: from calendar planning to the dispatch of the final product. In 1981 approximately 5 percent of American enterprises with production of a continuous nature had unified integrated systems for comprehensive automation. It is expected that by 1990 they will appear in approximately half of the enterprises in the United States, Japan and Great Britain.

In the branches with discreet production (particularly in places where the products are manufactured in small series²) it is considerably more difficult to create integrated systems for controlling all stages of production. Now in Japan and the United States they have developed plans for fully automated machine-building enterprises in which systems of interconnected computers will control all of the plant's activity. It is expected that the first of these enterprises will go into operation in the mid-1980's. Individual companies have already advanced far in their creation. At one of the enterprises of the Japanese Fudzitsu-Frank for producing machines that manufacture magnetic tape, the computer that was put into operation in 1982 has taken over control of all production processes. Only three people are permanently employed at the plant: the director, his secretary and an engineer-repairman.³

The basis for the creation of comprehensively automated machine-building plants is the unification of systems for automated planning (SAPR) and automated systems for control of technological processes (ASU TP). With automated planning one develops not only the parameters of the item, but also the program for manufacture on the GPS of the item itself, the necessary instruments and fittings. Moreover, they draw up calendar plans, determine the needs of the enterprise for raw material, fill out the appropriate orders, and so forth. When the SAPR is combined with flexible production systems one can begin to produce products immediately after completing the planning.

There is no doubt that the application of the SAPR and ASU TP and the creation of comprehensively automated plants on the basis of these will be a real revolution in machine building. Now the operating period (time of direct influence of means of labor on the object of labor) of a typical machine-building enterprise is only 5 percent of the time of production, and 95 percent goes for waiting, feeding in the parts for processing, installing the blanks on the machine tools, removing the processed part and moving it throughout the enterprise. The systems described above eliminate

nonproductive losses of time and will essentially increase the flexibility of production and labor productivity (30-50-fold). In spite of the high cost of integrated SAPR's and ASU TP's in the United States it ranges from \$150,000 to \$2 million, the time period for recouping these expenditures, as a rule, is less than a year.

The United States now produces 85 percent of the integrated SAPR's and ASU TP's in the capitalist world. In 1981 their sales volume amounted to \$750 million, and by 1984 it had increased to 2.2 billion. Leadership in this sphere will make it possible for the United States, in spite of lagging behind Japan in the utilization of flexible systems, to maintain a leading role in the capitalist world in automation production. It is expected that by 1990 20 percent of the Japanese machine-building enterprises, 25 percent of the American ones and 10 percent of the English ones will have integrated systems of SAPR's and ASU TP's; more and more extensive utilization of these systems will become a decisive factor in increasing the effectiveness of production in developed capitalist countries.

In the final part of the stage of automation under consideration the integrated systems of SAPR--ASU TP, which are based on microelectronics and robots, will be combined with information management systems. As a result there will be a unified integrated system in which computers will take over both technical and organizational-economic control of all stages of production. The main consequence of the creation of such a system is further increase in the productivity of labor and the flexibility of production.

Obstacles in the New Stage of Automation

The introduction of microelectronic equipment is being held up significantly by: the inadequate production of certain kinds of it; the manufacture of microprocessors, microcomputers, robots and machine tools with numerical program control without taking into account the possibilities of creating from them GPS's and blocks of automated equipment; and inadequate software. The overall condition of the economy of developed capitalist countries (crises, considerable underutilization of production capacities and so forth) also does not contribute to capital investments in the new automated equipment.

The newest automated equipment is very complex and when it breaks down it leads to significant economic losses. At the same time there are not enough skilled repair workers in the capitalist countries. Moreover, it is generally inefficient to have repair workers of all specialties and occupations at an enterprise. In this situation the firms that produce the equipment must take on at least some of the functions for repairing it, mainly rapid diagnosis of troubles and their causes. At the end of the 1970's and the beginning of the 1980's certain very large machine tool-building firms of the United States and Japan created special services which, with the help of computers (for instance, by telephone), give a diagnosis of the troubles in machine tools with numerical program control that are being used by the consumer, and others went even further--they repair the broken modules of automated equipment. But a more typical situation is when the firms that produce the automated equipment offer no services in the sphere of repair, which reduces the effectiveness of its utilization.

If the manufacturing firms do not participate in the development and realization of the corresponding plans, failures are also inevitable. The reason is the same--the complexity of modern technical equipment. According to data from the American firm Lockheed, 30 percent of the unsuccessful attempts to introduce automated equipment and 68 percent of the failed attempts to introduce it by specialists of the consumer firms themselves were related to mistakes in the stage of planning. It is emphasized in an official investigation in the international organization of labor that the resistance of trade unions, engendered by the fears of the workers that they will lose their jobs as the result of the introduction of microelectronic equipment, is the most serious obstacle in the past to the development of the new stage of automation. It is no wonder that in terms of the scale of application of the latest kinds of automated equipment (robots, GPS's) Japan has taken first place in the capitalist world. Until recently Japanese trade unions have been more loyal than trade union organizations of the United States and Western Europe when it comes to automated technical equipment. But now they too are alarmed: Will the accelerated introduction of robots and microelectronic equipment not lead to a drop in employment and increase unemployment?

The quality of the decisions concerning the introduction of new automated equipment depends essentially on the qualifications of the managers who make these decisions. Yet a considerable part of the upper management personnel, especially in the United States and Western Europe, do not have the qualities necessary for rapid development of a new stage of automation. For example, an investigation conducted at the end of the 1970's in the United States showed that among managers of the 100 leading corporations 33 percent were financial experts or lawyers, 30 percent--specialists in the area of trade and advertising, and only 33 percent had received a higher engineering and technical education. Correspondingly, the majority of even large American companies until recently had not developed long-range strategic plans for improving the technology of production (while at the same time long-range plans in the area of finance and marketing were being developed by American firms even in the 1960's). The situation is much better in Japan, where more than 70 percent of the managers are engineering and technical specialists with high qualifications. Since the 1960's the majority of large Japanese corporations have been regularly drawing up and implementing long-range strategic plans for the development of production technology.

Numerous investigations conducted in capitalist countries at the end of the 1970's and the beginning of the 1980's showed that further automation is basically being impeded by the shortage not only of managers, but also of engineering and technical specialists and skilled workers who are capable of servicing the latest automated equipment. Thus in the United States the proportion of systems analysts and programmers among workers employed in the national economy reached 0.5 percent at the beginning of the 1980's (in other countries--approximately 0.25 percent) and the absolute number of them barely exceeded 500,000, while the demand was for 1 million. The shortage of workers in these key occupations for the utilization of computers and other programming equipment amounted to 0.5 million people in the United States. Moreover, the companies are not satisfied with the quality of training of specialists and laborers who service modern technical equipment. For example,

the programmers for machine tools with numerical control, computers, SAPR's, ASU TP's and so forth must not only know the languages and methods of programming, but must also have engineering and technical training in the area for which they are writing the programs. Actually only a few of them meet this requirement.

The main reasons for the shortage and inadequate training of these categories of workers lies in the capitalist method of production and its inherently random development of the economy, the striving of the entrepreneurs to use any means to transfer expenditures for training and retraining of the labor force onto the workers themselves and the state.

The companies strive to reduce the negative influence of the shortage of highly skilled workers on the rates of introduction and the effectiveness of the utilization of modern automated equipment. An increasingly large number of firms are providing the equipment they manufacture and sell with base sets of programs. For those functions and operations for which there is a severe shortage of workers, automation is being introduced at accelerated rates. Even for programming machine tools with numerical program control using computer equipment the need for programmers of this equipment is decreasing to one-fourth the previous level. When the SAPR's and ASU TP's are combined into a unified complex the workers of this occupation will no longer be necessary at all. Automation of the diagnosis of troubles reduces the demand for repair workers to one-fifth to one-tenth. Experts think that the shortage of specialists in computer equipment will lead in the near future to the creation of computers which program themselves by a verbal command from an individual, and then the need for computer programmers and operators will also disappear.

The overall effect from the application of automated equipment is manifested throughout the entire period of its operation. The rates of its introduction depend essentially on whether or not the firm is oriented toward obtaining long-term or short-term economic advantages. For a company which is maximizing annual profit the introduction of automated equipment, the entire effect from whose utilization can be achieved in several years, is less advantageous than for a firm which is striving to obtain a large profit over the long-range future. In Japan there is a predominance of the latter type of companies, and in the United States and Western Europe--the former, which also relates to the fact that the latest automated equipment is being disseminated more rapidly in the Japanese economy than in the American and Western European.

The New Stage in Automation and Production Relations of Capitalism

The consequences of the new stage in automation are not limited to changes in production forces, but affect practically all aspects of production relations of the bourgeois society.

The development of automation contributes to further raising the level of concentration and centralization of production. Mass introduction of GPS's leads, predictably, to the elimination of many small firms which are operating with small-series production and to the creation of large enterprises and companies in this sphere.

The new stage in automation reduces industry's demand for labor force to a minimum, thus reducing the foreign trade advantages of Third World countries related to the less expensive labor force. Developed capitalist countries have the opportunity to restore certain traditional branches that have been operating at a loss recently. This reduces the incentives to move capital to the developing countries.

The production of microprocessors, microcomputers and robots itself is rapidly being automated. As a result, despite the high growth rates of production, the number of employees in the electronics industry is increasing insignificantly or even decreasing. Thus in electronic machine building in Japan, which occupies first place in the capitalist world with respect to rates of increase in the volumes of production, the number of people employed during 1978-1982 dropped from 1.4 million to 1.3 million.

As time passes the considerable proportion of workers who are crowded out will not find work in the nonproduction sphere where, as a result of rapid dissemination of microelectronic equipment, the demand for labor force is also decreasing. As a result of the fact that the products are less competitive it will be impossible to avoid increased unemployment both in countries which are successful in rapidly introducing microelectronic equipment and in those which are lagging behind.

Under capitalism the latest automated equipment is used primarily for the arms race. The majority of automated equipment (machine tools with numerical program control, electronic computer equipment, systems for automated planning) has been created with money from the Pentagon and were first used in the military branches. Previously the Pentagon financed the development of basically individual kinds of automated equipment, but now it provides funds for comprehensive automation of entire productions and enterprises. Thus since 1978 the U.S. air force has been allotting funds for the long-term program entitled "Integrated Industrial Production With Computers" which includes more than 20 scientific and technical projects. Its main goal is to create fully automated machine-building enterprises, mainly for the production of military systems.

Under capitalism one cannot fully take advantage of all the possibilities of the application of microelectronic equipment. Therefore the new stage in automation is only aggravating the economic and social contradictions of the capitalist method of production.

FOOTNOTES

1. Certain economists think that it is precisely the cyclical and structural crises of the 1970's that laid the basis for the new stage in the development of automation in developed capitalist countries. "Nauchno-tekhnicheskaya revolyutsiya i protivorechiya kapitalizma" [The Scientific and Technical Revolution and the Contradictions of Capitalism], Moscow, 1981, p 77.

2. According to estimates, approximately 75 percent of the industrial output of capitalist countries is manufactured in branches with single-unit and small-series production.
3. The products are only manufactured at this enterprise. Their design and sales, calendar planning of production and so forth are carried out outside the plant by specially authorized organizations.

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RECENT BOOKS ON ECONOMICS AND ERGONOMICS SURVEYED

Novosibirsk EKONOMIKA I ORGANIZATSIYA PROMYSHLENNOGO PROIZVODSTVA (EKO) in Russian No 7, Jul 85 pp 185-186

[Article by M. B. Kelendzheridze, engineer, Georgian Branch of the All-Union Scientific Research Institute of Technical Aesthetics (Tbilisi): "At the Juncture of Economics and Ergonomics"]

[Text] The average amount of time for a complete updating of knowledge in the branches of science, according to some figures, amounts to 15-20 years, and for the young, rapidly developing scientific disciplines the period of obsolescence is even less--8-12 years. Microelectronics is setting even more rapid rates.

Six years ago EKO published a fairly complete survey of the work generated at the juncture of economics and ergonomics, engineering psychology.¹ Is there no period of "semidecline" of knowledge here? Is it really true that during this time there has been an updating of approaches, principles and factual material? Perhaps the answer will be affirmative: three books have come out, each of which is fundamental in nature. They actually reflect three main tendencies, main directions in the development of theory and applied research.

First, the integration of knowledge has been noted. For example, in order to gain an idea of the structure and limits of engineering psychology it was previously necessary to look through no less than 10 publications. Today, for the first time in socialist countries, a "reference work on engineering psychology" has been created (Moscow, "Mashinostroyeniye", 1982, 368 pp). Working on it for several years was a collective of 12 leading specialists, doctors and candidates of sciences. The reference work was edited by a corresponding member of the USSR Academy of Sciences, D. F. Lomov; the reviewer was a candidate of psychological sciences, a pilot-cosmonaut, G. T. Beregovoy. The book has seven chapters which reflect all aspects of the system "Man--Machine--Environment"; it is accompanied by a good subject index, a solid bibliography (228 domestic titles) and a useful list of standards. Incidentally, the reference work was first noted abroad (see the journal INDUSTRIYSKO OBLIKOVANYE, Belgrade, 1982, No 70, p 53). But here too the addition--40,000 copies--was quickly absorbed by the grateful engineering community and now they are quite legitimately considering the question of a second edition of the reference work.

Second, we have a direct address from engineering psychology to economics. While previously economic aspects were touched upon indirectly in a number of narrow branch publications, today we have the excellent monograph of B. A. Smirnov, B. A. Dushkov and F. P. Kosmolinskiy, "Inzhenernaya psikhologiya--Ekonomicheskiye problemy" [Engineering Psychology--Economic Problems] (Moscow, "Ekonomika", 1983, 224 pp). Packed with a large number of examples of practical calculations, it is addressed to economists, workers of services for scientific organization of labor and engineers-planners, and it will undoubtedly be useful to them. By its nature the book augments the aforementioned reference work. It came out in the same number of 40,000 copies, that is, it actually is directed toward the same mass of readers. Our only complaint is that the book could have been more compact by reducing the amount of specifically psychological material. People interested in particular issues could quite easily be referred to PSIKHOLOGICHESKIY ZHURNAL, which in 1982 introduced a new rubric: "Psychology and Economics."

Third, we were previously bothered by the many aspects and thus a certain dispersion of the problems which were considered in engineering psychology. One got the impression of a dispersion of forces of such a heretofore large detachment of engineering psychologists, ergonomists, and specialists in technical aesthetics. Now five main schools have been defined: in Moscow--"pure" engineering psychology and design; in Leningrad--the human factor in automated systems; in Riga--the heuristic aspects (see EKO, No 3, 1980); in Kiev--the applied aspects of aviation; and, finally, in Rostov--the reliability and rapid action of the system "Man--Machine." The last area was announced in the collection entitled "Nadezhnost i bystrodeystviye cheloveko-mashinnykh sistem" [The Reliability and Rapid Action of Man-Machine Systems] (Izd-vo Rostov Universitet, 1983, 144 pp, 800 copies). Like all collections which establish a trend, it is distinguished by a certain abstractness of theory and excessive narrowness of practice. Probably in subsequent publications this "childhood disease" of growth and establishment will be overcome.

FOOTNOTE

1. EKO, No 12, 1979.

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BUREAUCRATIC RED TAPE SATIRIZED

Novosibirsk EKONOMIKA I ORGANIZATSIYA PROMYSHLENNOGO PROIZVODSTVA (EKO) in Russian No 7, Jul 85 pp 187-189

[Article by N. V. Minayeva, docent of the State Pedagogical Institute imeni V. I. Lenin (Moscow): "Not a Minute of Rest"]

[Text] The first morning visitors who appeared in the reception room were surprised to see on the desk of the reviewer Telyatnikova a handful of ashes rising up all by themselves on the green cloth.

"She burnt up at work!"--the secretary gasped and, dropping her Belgian shoes, rushed to the neighboring department to share the news.

The news produced the effect of a thunderstorm after long days of waiting for it. "You work to exhaustion!" the chief of the division for quality began to weep. "What is so surprising in that?..."

They began step by step to recall the previous day. The reviewer of the production association for footwear entitled "Solid Sandal" usually did not know a minute of rest. They heard that beginning in the morning she called the structural units and demanded from the docile footwear workers information on the increased effectiveness of their labor. At one time Uncle Yasha and Uncle Misha would sit on the corner across from the "Gastronome" and discuss the entire region. They did this in a primitive way, without including market funds or the general director. But now! "Now we have," the reviewer Telyatnikova loved to say, "a head enterprise, mechanized flow lines, a head technologist and head psychologist, a central bookkeeping office and price list division, a technical and economic bureau, a design and research division, and an ASU, KSUKP, KTU and KK. We have everything and it is all the latest word." "If only the clients would not intrude," complained the reviewer, "they bring confusion everywhere they go, their time periods do not suit them, or they have complaints about the quality. Were it not for them everything would be fine. And the indicators are excellent!"

Yesterday after gathering the information about effectiveness, she had to take care of the reports on savings. A special group was created in the association to take care of thriftiness. She plunged into it so zealously that now it was time for a second group in order to process the documentation

created by the first group. In order to explain the details of the calculation of the required coefficients, they contacted a methodologist who handles their scientific substantiation. After they heard the quotations from the works of the classicists concerning net output and the economic content of past labor, they would send a box of candy to the inspector of the reports on any occasion.

Having taken care of the matters of savings and effectiveness, Telyatnikova began to solve production problems. The first thing she did was to telephone the fur shop "Fur Services" and on behalf of the association and requested furs for two merchants on whom depended the delivery of the fashionable platforms called "cow's hooves." The platforms were sewn on instead of the unfashionable soles that had been ripped off new footwear, and through this operation they managed to take care of the lion's share of the volume of sales.

Having solved this problem she contacted the footwear factory "Rekord" and made an agreement to increase the production of the shoes from which it was so advantageous to rip off the soles. "And you fulfill the plan," she explained, "and we shall overfulfill it. We shall give the workers more services!"

Toward the end of the day the reviewer managed also to contact the Bath and Barber Trust imeni Agatha Christie, which was called that either because of the writer's passion for baths or because of the cases of mysterious disappearance of underwear without a trace. It was necessary to come to an agreement about a sauna for the next commission which was to be sent by one of the administrations.

Evening was drawing near and it was necessary to study the new instructions, to fill out the questionnaires someone had sent, and to fill out the report on output, which for some reason had decreased, and also on production costs, which for some reason had increased. She was waiting for approval for a paper concerning the transfer of Uncle Yasha and Uncle Misha who had once served the entire region and were being eliminated now on the recommendations of the group for thriftiness. "Is it really possible to cope with all of this alone?" exclaimed the reviewer. And nervously pulling out a cigarette, pursing her lips, she sat down to write a report on the need for a new staff unit--senior reviewer for the general director.

She sat working on the draft until midnight.

"And she herself did not notice how she burned up!" Her coworkers were distressed. The activists began to organize a solemn commission, and the collective began to morally prepare themselves for the tragic end.

Suddenly a frightened scream caused everyone to turn around. Reviewer Telyatnikova, pale but alive, stood at the door pressing a bright box to her chest. She had spent the morning hours looking for cigarettes to replace the ones she had smoked during the night.

"Sometimes a person simply burns up doing this damned work!"--she sighed and sat down at her desk.

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